Bulletin

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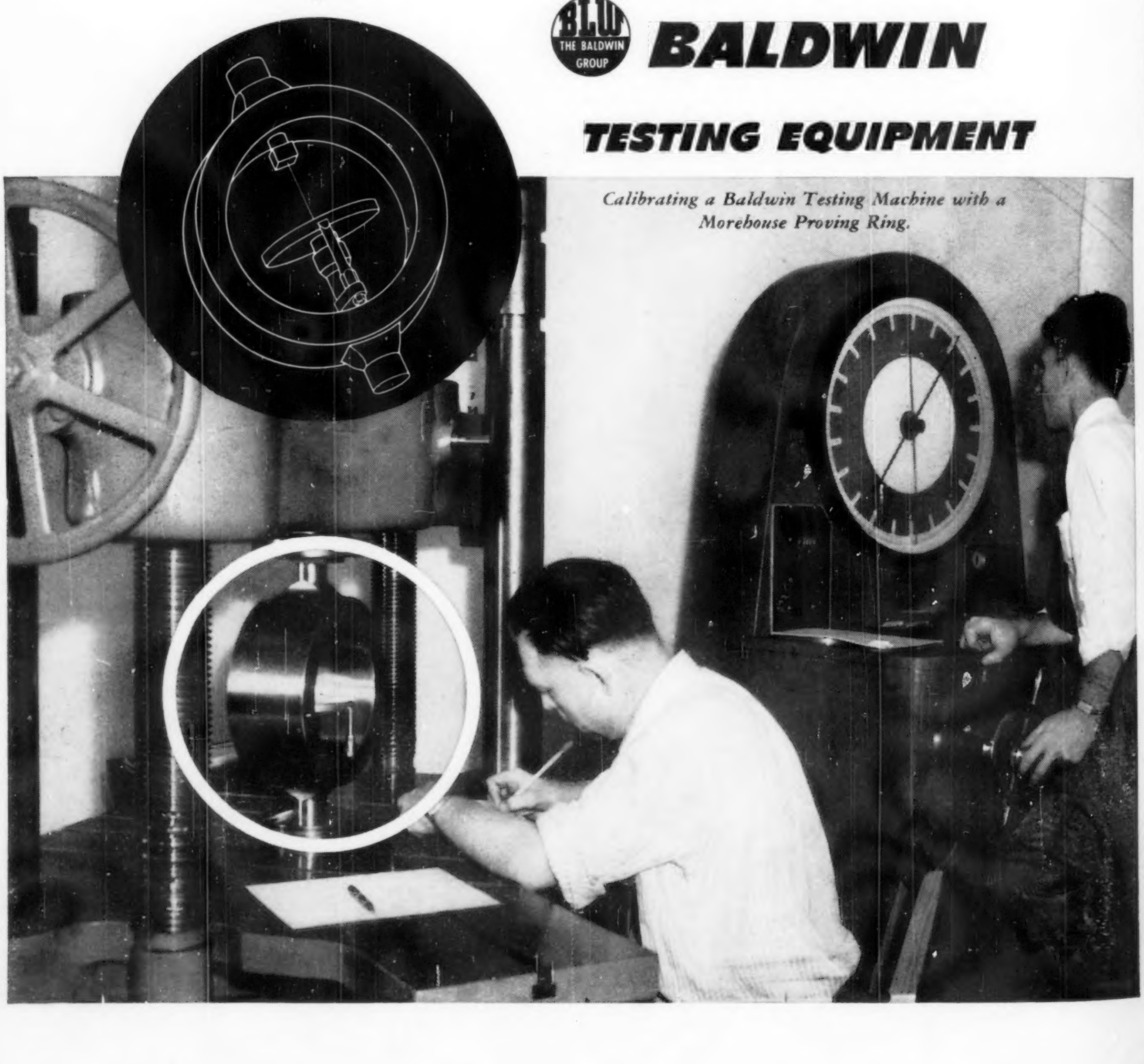

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ASTM BULLETIN, August, 1946. Published six times a year, January, March, May, August, October, and December, by the American Society for Testing Materials. Publication Office—20th and Northampton Sts., Easton, Pa. Editorial and advertising offices at the headquarters of the Society, 1916 Race St., Philadelphia 3, Pa. Subscription $2.00 a year in United States and possessions, $2.25 in Canada, $2.50 in foreign countries. Single Copies—50 cents. Number 141. Entered as second class matter April 8, 1940, at the post office at Easton, Pa., under the act of March 3, 1879.

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ASTM BULLETIN

Published by
AMERICAN SOCIETY for
TESTING MATERIALS

This Issue Contains

NEWS ABOUT THE SOCIETY AND ITS COMMITTEES:

MISCELLANEOUS TECHNICAL NOTES AND NEWS:

AUGUST—1946

No. 141

3 NEW TOOLS FOR PRODUCTION LINE OR LABORATORY

• **SAVE TIME**

• **SAVE MONEY**

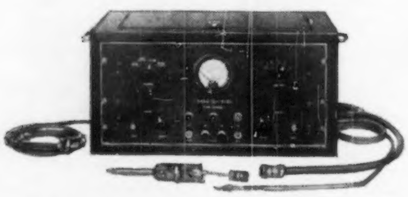
●Newly-discovered application—new G-E leak detector is being used in a test for leaks on a large transformer cover. This method is quicker and does not contaminate the oil as the old method using soap solution and air pressure did.

The newly-developed instruments shown on this page are already proving their value in scientific and industrial processing fields. Expert design assures simple installation, easy operation, and a minimum of maintenance. Fast and accurate performances result in time and cost savings. These tools solve newly-encountered problems and replace old tedious methods. Recently-found applications of these instruments are constantly simplifying testing procedures and improving production rates.

1. NEW LEAK DETECTOR DOES FASTER, BETTER JOB . . .

In the application shown, the G-E leak detector is being used to test studs on transformer plates for oil tightness. Contamination of material, which results from the method using air pressure and a soap solution, is avoided since helium, which is inert, is used as the tracer gas. The leak detector is a special mass spectrometer which locates leaks in closed systems—even small leaks in the presence of large ones. It is used to test leakage in radio tubes, refrigerator parts, boiler tanks, piping systems, and other closed systems which can be evacuated. For further information, write us.

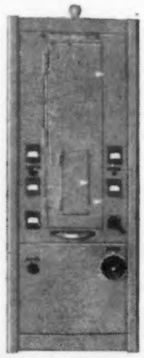
2. ION GAGE MEASURES HIGH VACUUMS



With the G-E ion gage, the highest vacuums ordinarily encountered in factory or laboratory processes can be measured or monitored continuously. This instrument is used to measure high vacuum in process-control spectrometers, electronic-tube manufacture, vacuum-pump testing, and as a vacuum-failure relay. It measures pressures of 10^{-4} mm (0.1 micron) to 10^{-7} (0.0001 micron) of mercury. The ion gage circuits permit the indication of small pressure changes and the measurement of slow pressure drifts—without the inconvenience of continual adjustment. The gage tube filament is protected by automatic disconnection of the current at pressures above 10^{-4} mm. Write for Bulletin GEA-4529.

3. X-RAY PHOTOMETER FOR CHEMICAL ANALYSIS

Independent of the physical or chemical state of the material, the X-ray photometer indicates the concentration of one chemical element in the presence of others. Typical applications include the determination of the sulphur content of oil, the ash content of coal, and the halogenated hydrocarbon content of plastics. Built for continuous use, the X-ray photometer operates on the principle of X-ray absorption between sample and reference. Write for further information.



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ASTM BULLETIN

"Promotion of Knowledge of Materials of Engineering, and Standardization of Specifications and Methods of Testing"

TELEPHONE—Rittenhouse 6-5315 | R. E. Hess, Editor | R. J. Painter, Associate Editor | CABLE ADDRESS—TESTING

Number 141 | August 1946

1946 Annual Meeting Outstanding in Many Respects

Combination of Activities Results in Intensive Week

The combination of 25 distinct technical sessions including eight formal symposiums, more than 200 meetings of technical committees, plus two exhibits, one the Seventh Exhibit of Testing Apparatus and Related Equipment, the other the Fifth Photographic Exhibit, resulted in an Annual Meeting in Buffalo throughout the week of June 24 which was an intensive one for almost everyone present. Probably at no other A.S.T.M. meeting has there been such a comprehensive technical program, and the number of new problems and subjects being studied and developed by several new and many of the older technical committees gave the meeting a breadth of perspective which indicates that the Society has a tremendous docket of problems before it.

There appear below some notes on features of the technical program but it is virtually impossible for a news article to convey a true conception of the value of even one of the symposiums or sessions. Only those who attended and participated in the session or will have reviewed in detail the published papers and discussions can make a true appraisal of just how interesting and worth while the project may be.

New President

Arthur W. Carpenter

The Seventh Exhibit of Testing Apparatus and Related Equipment, renewed after a lapse of four years, the last having been held in 1941, and the Fifth Photographic Exhibit attracted a great deal of interest, and again proved to be most desirable adjuncts of the technical meetings. Further details of these two exhibits are noted elsewhere in this BULLETIN.

For their three outstanding technical papers, respectively, H. R. Copson, The International Nickel Co., R. C. Brumfield, California Institute of Technology, and C. W. Muhlenbruch, Carnegie Institute of Technology, received, in the order named, the Charles B. Dudley Medal, the first Richard L. Templin Award, and the Sanford E. Thompson Award. See next few pages for more details.

The Annual Meeting Dinner arranged through a local committee headed by W. H. Lutz, Pratt and Lambert Co., was probably the finest that has been held. The food, speakers, and other events with incidental music combined to make an event that will long be remembered by those in attendance. The affair was well timed and everything went off much like clock-work. The Annual President's Address, given this year by John R. Townsend on the subject "The Challenge of National and International Affairs to the Engineer," and the extremely interesting address by the guest speaker, Dr. B. K. Sandwell, Editor of Canada's famous publication *Saturday Night*, who spoke on the subject "A Testing Time for Canada" were both very fine contributions. Mr. Townsend's address is published elsewhere in this BULLETIN.

LOCAL COMMITTEE ON ARRANGEMENTS

Groundwork for the activities of the local Buffalo Committee on Arrangements had been laid by District Chairman B. L. McCarthy who, unfortunately, was taken seriously ill late in the spring, and the time-consuming and energy-absorb-

New Vice-President

Richard L. Templin

At the Annual Meeting Dinner: from *l.* to *r.*, I. C. Matthews, Vice-Chairman, Western New York-Ontario District; Dr. J. J. Mattiello, Marburg Lecturer; F. N. Speller, Honorary Member; B. L. McCarthy, Chairman, Western New York-Ontario District.

Lower *l.* to *r.*, C. S. Reeve, Honorary Member; President Arthur W. Carpenter; Past-President W. H. Fulweiler, Honorary Member; Retiring President John R. Townsend.

ing task of directing many of the features fell to District Secretary T. L. Mayer, who served as Acting Chairman of the local committee. The personnel of the committee was published in the ASTM May BULLETIN but mention should be made of the excellent work of the chairmen of the various subcommittees who contributed greatly to the success of the particular phases of the meeting for which they were responsible. A list of the subcommittee chairmen follows:

- Dinner and Program—W. H. Lutz, Pratt & Lambert, Inc.
- Apparatus Exhibit—D. D. Crandell, National Gypsum Co.
- Photographic Exhibit—F. L. Koethen, Enterprise Oil Co.
- Trips and Plant Visitation—J. Gentile, Pittsburgh Testing Laboratory
- Ladies' Entertainment—Mrs. D. D. Crandell

Messrs. Lutz and Koethen in particular devoted a great amount of time to the planning and execution of the dinner and the Photographic Exhibit, respectively.

Attendance

While advance expectations that the total registration at the Annual Meeting might be an all-time high did not materialize, for three or four presumed reasons, nevertheless it was the second high and the figure of 1835 compares with the top of 2063 in New York City in 1944. Comparable registration figures for certain annual meetings are given in the following table.

REGISTRATION ANNUAL MEETING

Year	Members	Committee Members	Visitors	Total
1937	960	186	377	1523
1943	757	323	372	1452
1944	1185	368	510	2063
1946	978	405	452	1835

A comparison percentage-wise will show that the number of visitors in New York in '44 and in Buffalo in '46 were almost the same. There was a slightly higher percentage of members at the New York meeting, and a somewhat higher percentage of committee members in Buffalo. However, these figures are not too significant since there are so many factors affecting them. One which certainly had an adverse effect on the attendance in Buffalo was the housing situation. Including the several hundred visitors who came to the meeting primarily to attend the exhibit of testing apparatus, those in attendance at the meeting of the Society for Experimental Stress Analysis which includes quite a number of A.S.T.M. members, and others, there were between 2500 and 3000 technical men at some part of the meeting throughout the week.

Award of Medals

While the winners of the three coveted A.S.T.M. medals recognizing technical papers of outstanding merit were announced at the meeting, only two were awarded, the third one to be presented later because of inability of the recipient to be present at the meeting. Harry R. Copson, Research Chemist, International Nickel Co., Inc., Bayonne, N. J., received the coveted Charles B. Dudley Medal in recognition of his 1945 paper entitled "A Theory of the Mechanism of Rusting of Low Alloy Steels in the Atmosphere." C. W. Muhlenbruch, Associate Professor of Civil Engineering, Carnegie Institute of Technology, received the Sanford E. Thompson Award, sponsored by A.S.T.M. Committee C-9 on Concrete and Concrete Aggregates, for his paper on "The Effect of Repeated Loading on the Bond Strength of Concrete," and R. C. Brumfield, Department of Mechanical Engineering, California Institute of Technology, will receive the first Richard L. Templin Award at a later meeting sponsored by the A.S.T.M. District in Los Angeles. His paper, also in the 1945 Proceedings, covered "A Sulfur Print Method for the Study of

Crack Growth in the Corrosion-Fatigue of Metals."

The Dudley Medal commemorating the Society's first President, is awarded for the outstanding paper constituting an original contribution on research in materials. The new Templin Award, established through the generosity of Richard L. Templin, is intended to stimulate research in the development of testing methods and apparatus and to recognize technical presentations in this field. The Thompson Award, named for the first Chairman of Committee C-9, recognized a paper of outstanding merit on concrete and concrete aggregates. To those members who wish to study these papers, they appear in the 1945 *Proceedings* beginning on the following pages:

Copson	page 554
Brumfield	page 544
Muhlenbruch	page 824

Photographs of the winners appear in this BULLETIN together with short biographical sketches. Without embarrassing the winners it can be stated their ages total about 84, indicating an average of 28.

NEW OFFICERS

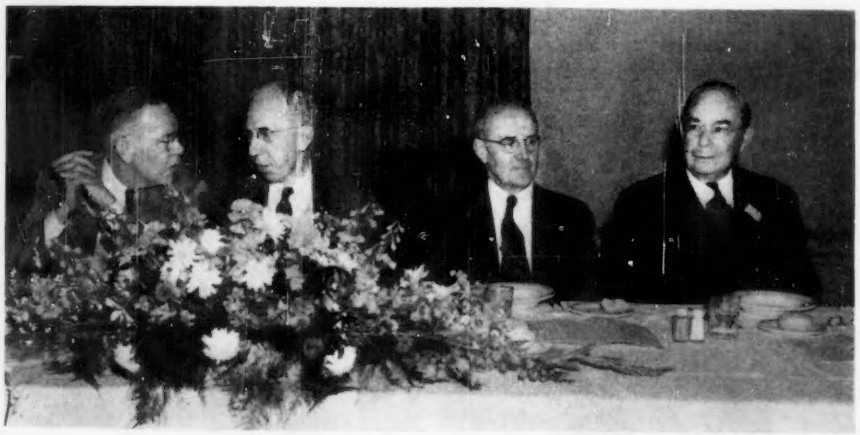
Results of the letter ballot on election of new officers were announced at the dinner, and the new President, Arthur W. Carpenter, the B. F. Goodrich Co., and the Vice-President, R. L. Templin, Aluminum Company of America, were introduced and spoke briefly. Biographical data on these two men and the five newly elected Directors appear on an adjoining page. There is also information elsewhere in this BULLETIN dealing with the establishment of the new Board of Directors.

MARBURG LECTURE

Dr. J. J. Mattiello, Vice-President and Technical Director of the Hilo Varnish Corp., presented a most interesting Marburg Lecture covering salient features of the topic "Protective Organic Coatings as Engineering Materials." Obviously in the time allotted he could not cover the field anywhere near as exhaustively as his printed lecture will do. He stressed the scientific aspects of organic coatings and gave a conception of the very wide variety of uses. A capacity audience was present at the lecture indicating the interest in the subject. The published lecture is expected to be available sometime during the fall and further announcement will be made.

DR. SANDWELL'S ADDRESS

Dr. Sandwell's address, "A Testing Time for Canada," was an entertaining but withal a very thought-provoking one. He first expressed a very close community of thought with President Townsend's address, stressing the necessity of closer participation on the part of engineers and technical people in government and civic affairs. With the Society's work in the testing of materials in mind he wondered if there would not be a field for an organization for the testing of engineers and politicians. The theme which he developed and which was the keynote of his remarks involved the great responsibility which the United States has as the leader of democratic thought and action in government. He referred to the changing concepts of



Speakers' Table Continued: *l.* to *r.*, T. L. Mayer, Toastmaster and Acting Chairman, Buffalo Committee on Arrangements; Guest Speaker, Dr. B. K. Sandwell; Dr. O. W. Ellis, District Vice-Chairman; J. S. Miller, Honorary Member. Lower *l.* to *r.*, T. A. Boyd, A.S.T.M. Vice-President; J. J. Shuman, Honorary Member; R. L. Templin, Vice President; Charles Lipson, President, Society for Experimental Stress Analysis; Executive Secretary C. L Warwick.

democracy as demonstrated in the United States during recent years and pointed to the tremendous influence of American industry, know-how, and action in world affairs. This influence will have a great impact on the other world democracies including Great Britain and Canada who are looking to the United States as a leader in perpetuating and extending the principles which they hold dear. He referred to the very close relations between Canada and the United States both from the economic and from the cultural standpoint.

Technical Sessions

The notes which follow may suffice to give members and other Bulletin readers some idea of the nature of outstanding technical sessions at the meeting. The Provisional Program published in the May Bulletin was followed closely; and through the receipt of preprints, (most of the papers and reports being distributed in advance) and later, by reviewing the 1946 *Proceedings* and other publications a member can study in detail the findings reported and discussions of the papers.

Symposium on Bearings:

The Symposium on Bearings held during the opening session of the Annual Meeting was well attended and there was a very interesting and lively discussion of the five papers presented by leading authorities in this field. To our knowledge this is the first time that the subject of the testing of bearings has been discussed in a symposium at a meeting of any technical society. The first paper by E. T. Johnson, Chrysler Corp., presented interesting data on a method of testing plain sleeve bearings of the automotive type. The machine described has given accelerated results that can be correlated well with service performance and has served as a valuable tool in comparative tests of various babbitt materials.

The second paper in the symposium was by Thomas Barish, Consulting Engineer, Washington, D. C., who presented details of the various machines used by a number of the bearing companies in their tests, including Timken, Marlin Rockwell, Fafnir, and the New Departure Div. of General Motors Corp. An interesting point brought out by Mr. Barish was that the life scatter curves resulting from the testing of roller bearings had quite a marked similarity to the curve of human life expectancy. This was confirmed also in the paper on the development of fatigue testing of roller bearings by H. R. Gibbons, Hyatt Bearing Div., General Motors Corp., which showed the development of machines for such testing from the early days through the 50,000-lb. radial capacity machine of 1924 to the modern machines with radial and thrust capacities of 300,000 lb. and 150,000 lb., respectively.

One of the most interesting papers in the symposium was that by A. B. Jones, New Departure Div., General Motors Corp., who reported on metallographic observations of ball-bearing fatigue phenomena. He showed that by overstressing bearings in test it was possible to develop a very definite and metallographically detectable change in the structure of the steel which corresponded to the structure found in bearings which failed in service.

The final paper covered a recently developed type of testing of airplane bearings under controlled load by J. M. Frankland of the Chance Vought Div., United Aircraft Corp.

Harry R. Copson—Dudley Medalist

A native of Massachusetts, he received his B.S. degree from Massachusetts State College, and his Ph.D. in Physical Chemistry from Yale in 1932. He has been with the International Nickel Co. since 1934, and has prepared numerous technical papers, several jointly with other leaders in the field of corrosion at International Nickel. His chief interests are corrosion, electroplating, nickel and nickel alloys. He is a member of several societies including the A.I.Ch.E., Electrochemical Society, and the American Chemical Society. At the 1946 A.S.T.M. Annual Meeting he presented another interesting paper with W. A. Wesley entitled "Corrosion Behavior of Stainless Steel Insect Screens."

Robert C. Brumfield—Templin Award Winner

Receiving his B.S. degree from California Institute of Technology in 1940, with the M.S. in M.E. in 1941, Mr. Brumfield received his Ph.D. in '43, his thesis covering "A Method for Recording and Studying Crack Growth in the Corrosion Fatigue of Metals." Concentrating on corrosion fatigue research for several years, he was Instructor at California Tech. and later Research and Development Engineer for the Aerojet Engineering Corporation, and also affiliated with the Naval Ordnance Test Station at Pasadena. He will receive the Templin Award at a later District Meeting in Los Angeles.

C. W. Muhlenbruch—Thompson Award Winner

After receiving his degree of B.S. in C.E. from Illinois in 1937 (M.S. degree, Carnegie in 1943, C.E., Illinois in 1945), Mr. Muhlenbruch was affiliated for about two years with the Aluminum Research Laboratories, and then beginning September, 1939, has been at the Carnegie Institute of Technology, now being Associate Professor. He is in charge of the Materials Testing Laboratory and course work in engineering materials and construction. He does considerable consulting work with a variety of structural materials and problems. He is active in A.S.T.M., and affiliated with several other societies.

Fatigue and the Testing of Parts and Assemblies:

In addition to the Symposium on Bearings, the Administrative Committee on Simulated Service Testing was largely instrumental in having two other Symposiums presented at the June meeting, both of them extending into two sessions. The first of these was the Symposium on Fatigue whose eight papers were evidence of the renewed and enlarged interest in this subject symbolized by the organization of the new Committee E-9 on Fatigue, as mentioned elsewhere in this BULLETIN. The other Symposium was held jointly with the Society for Experimental Stress Analysis and included seven papers on the subject of the Testing of Parts and Assemblies and carried the subject of fatigue testing over into this enlarged field.

In opening the latter symposium President J. R. Townsend aptly remarked that the testing of parts and assemblies is extremely important, since in every discussion of materials of engineering, the ultimate thing with which we are concerned is that the materials must be used in a practical working part. Therefore, he pointed out, it is necessary to test, not only the material, but the part itself, under proper environmental influence, in order that we may be sure that the part will operate satisfactorily. This is becoming increasingly necessary, he added, as the manufacturer of finished apparatus or equipment, under our present manufacturing methods, is becoming more and more dependent on assemblies of components made by others.

The papers presented at the fatigue symposium covered the subjects of rail steel tests at the University of Illinois; the damaging effect of fatigue stressing as determined at the National Bureau of Standards; fatigue testing of wood and wood constructions at the Forest Products Laboratory; and a comparison of different types of fatigue testing of aluminum alloys and a plastic at the University of Illinois. At the second session of the symposium, data were presented on testing of numerous copper alloys by the American Brass Co. and of beryllium copper at the Bell Telephone Laboratories; also on magnesium alloys at the Battelle Memorial Institute and on both magnesium and aluminum alloys at the Dow Chemical Co. All of these papers and the discussion that accompanied their presentation will be published by the Society in a separate volume.

In the Symposium on Testing of Parts and Assemblies papers were presented on work done on joints in magnesium alloy sheet at Battelle Memorial Institute; on magnesium alloy castings at the Dow Chemical Co.; and on pneumatic fatigue machines for testing gas-turbine buckets at the General Electric Co. Data were also presented on testing engine components at the General Motors Corp., and on the joint work at Chrysler Corp. and the Timken Roller Bearing Co. on automotive rear axles, while a paper on work done at the Continental Aviation and Engineering Corp. pointed out the fundamental importance of design. Also presented at the second session of this symposium was a paper on materials for marine propellers, covering work at the Naval Experiment Station at Annapolis. This symposium will also be published as a separate volume.

Symposium on Oil Procurement Practices:

There has been considerable discussion and agitation for detailed and comprehensive specifications for use in the purchase of lubricants and because of the difficulties of preparing such documents and the inherent dangers if the specifications were too rigidly applied, this symposium was developed by Technical Committee B on Lubricants of A.S.T.M. Committee D-2 so that there would be full opportunity for discussion of some of the perplexing problems. Opportunity was given for large purchasers of lubricants to describe the practices they are using to obtain satisfactory products for their respective uses, and then in a second session which included the Committee D-2 Report there was a further discussion, including that by a representative of the producing industry.

In general the practices have involved what might be termed a simplified screening specification which then would be evaluated through field and laboratory tests. Normally this would result in a list of approved products as covered by the general specifications, and based on service experience, satisfactory products could be obtained. Difficulties of establishing empirical values or tests, for example the oxidation stability tests, were pointed out. In this case, perhaps several dozen procedures have been evolved, and the results of any of these are difficult to correlate with actual use and service experience. This symposium achieved the important purpose of making available to all interested, successful practices used by leading companies to obtain what is needed in various industries including electrical manufacturing, chemical, airways, automotive and naval.

pH Measurement:

Arranged by Committee E-1 on

SUMMARY OF ACTIONS TAKEN AT ANNUAL MEETING AFFECTING STANDARDS AND TENTATIVES.

	Existing Tentatives Adopted as Standard	Standards in Which Revisions Will Be Adopted	New Tentatives	Proposed Revisions of Existing Standards Accepted as Tentative	Existing Tentatives Revised	Standards and Tentatives Withdrawn	Present Total Standards Adopted	Present Total Tentatives
A. Ferrous Metals—Steel, Cast Iron, Wrought Iron, Alloys, etc.	8	58	3	1	12	7	156	53
B. Non-Ferrous Metals—Copper, Zinc, Lead, Aluminum, Alloys, etc.	2	42	8	0	38	6	70	101
C. Cement, Lime, Gypsum, Concrete, and Clay Products	6	10	6	15	1	1	141	36
D. Paints, Petroleum Products, Paper, Textiles, Rubber, Soap, etc.	32	37	27	15	60	0	463	274
E. Miscellaneous Subjects, Testing, etc.	2	1	1	1	4	0	29	41
Total	50	148	45	32	115	14	859	505

Methods of Testing, this symposium was intended to provide a relatively comprehensive coverage of problems in this very important and growing field. Following a historical review which included discussion of various theories and concepts, there was a paper relating to the choice and definition of the pH scale, an extensive presentation by G. G. Manov, National Bureau of Standards, covering standard buffer solutions which have been developed and the manner in which the values are assigned. Then followed papers dealing with glass electrodes, colorimetric pH determinations, a question of an acidity scale, and potentiometric estimation of hydrogen ion concentration in nonaqueous media.

In connection with this symposium which will be published by the Society, it is of interest that Committee E-1 through its Technical Committee on Hydrogen Ion Determination has agreed on a proposed method for determining the pH of aqueous solutions with the glass electrode. The method which is expected to be accepted by the Society in the near future is concerned with measurements of pH values and does not cover the manner of preparing the solutions or extracts.

Spectrographic Analysis:

Under the auspices of Committee E-2 on Spectrographic Analysis, a most successful two-session symposium was held on Spectroscopic Light Sources. Developed by Messrs. E. B. Ashcraft, Westinghouse, J. Sherman, Philadelphia U. S. Naval Shipyard, G. H. Dieke, Johns Hopkins University, and Mary E. Warga, University of Pittsburgh, and Committee E-2 Secretary, the discussion was based on four papers. Following the paper by B. F. Scribner discussing the present status of excitation, Messrs. Enns and Wolfe covered controlled spark source, and in the second session R. C. Mason, Westinghouse Research Laboratories, described properties of gas discharges used as light source, and Dr. Dieke, in his paper, was concerned with short period behavior of the sources. These papers will be published together with the discussion and should be of interest to everyone concerned with the field of spectrographic analysis which has been growing by leaps and bounds. Much of the interest is traceable to the several symposiums developed by Committee E-2.

H. V. Churchill, Committee E-2 Chairman, who presided at the second session, pointed out that although those hearing the papers and the rather spirited discussion might gain the feeling that spectrographers were having much trouble on the methods and sources used, there is a great deal of extremely valuable information being developed and the spectrograph is giving very acceptable results. The spectrographer, like other progressive technologists, is anxious to perfect his technique even further and hence welcomes and supports a fundamental discussion of the important subject of light sources.

(See page 79 for reference to a British paper on this subject.)

Behavior of Corrosion-Resistant Steels:

The objective of Committee A-10 on Iron-Chromium-Nickel Alloys in sponsoring the Symposium on Atmospheric Weathering of Corrosion-Resistant Steels was to make available in as convenient form as possible the data that we now have on the behavior of so-called stainless steels in the atmosphere. This problem has been and is engaging the active interest of technologists in this field, many of whom serve on Committee A-10. This A.S.-T.M. group has sponsored a number of surveys and has participated in corrosion tests and at the moment has a plan under way for a rather comprehensive study. Meanwhile it seemed desirable to put on the record the data we now have.

Some of the data presented will be particularly valuable. For example, one paper gave results of fifteen-year exposure tests and there were discussions of atmospheric tests on high-chromium steels, results of considerable research on stainless steel insect screens, the effect of marine exposure tests on sheet, and discussions of architectural and structural applications. There was considerable exchange of comment on the desirability of passivating and on thermal treatment. Session Chairman F. L. LaQue, International Nickel Co., who had headed the group arranging the symposium, did an excellent job correlating the discussion and also stimulating comments from those present.

Effect of Temperature on the Properties of Metals—Gas Turbine Materials:

Continuing interest in the subject the effect of elevated temperatures on the properties of metals, and what alloys are available for resisting high temperatures and pressures was evident by the excellent attendance and discussion in the two sessions devoted to this subject. The first comprised five papers and talks on materials for gas turbines. This is probably the first meeting session where there has been freedom of discussion on some of the cobalt and other alloys which were important wartime developments, thus making it possible to produce the gas turbine, superchargers and other aircraft parts which contributed so much to the winning of the war. One or two technical papers were presented earlier in the year on some of these alloys, but this was the first organized session where there was a comprehensive discussion. Unquestionably some of the newer alloys and materials which have and will become available will have a marked influence in the field of aviaation and other transportation and some notable developments can be looked for in the next five to ten years. Meanwhile, production "know how," design, and fabrication will improve as reliable data and experience increase.

The second session at which the Report of the Joint Committee was presented was marked particularly by the wide range of materials covered and indicates the breadth of work with which the Joint Committee is concerned. In addition to an interesting paper dealing with the effect of carbide spheroidization on carbon-molybdenum steel, there were papers dealing with chromium alloys up to 2200 F. and discussions on properties of aluminum alloy sheet, magnesium-base alloys, and monel metal and copper.

(Please turn to page 12)

A. G. Ashcroft   A. T. Chameroy   J. H. Foote   L. H. Winkler   F. E. Richart

NEW OFFICERS

The recent election of officers, as announced at the Annual Meeting by the tellers, resulted in the unanimous election of Arthur W. Carpenter, as President (1946–1947), Richard L. Templin as Vice-President (1946–1948), and the following as Directors (1946–1949): A. G. Ashcroft, A. T. Chameroy, J. H. Foote, F. E. Richart, and L. H. Winkler.

President

ARTHUR W. CARPENTER, the new President, is Manager of Testing Laboratories, The B. F. Goodrich Co., Akron, Ohio. He received his B.S. degree in Chemical Engineering from the Massachusetts Institute of Technology in 1913; M.S., 1914. He was City Chemist, Alliance, Ohio, and Chemist of Akron Municipal Water Purification Plant; served overseas in World War I; and was then affiliated with The Goodyear Tire and Rubber Co. and with Holtite Manufacturing Co., Baltimore, as Superintendent. Returning to Goodyear as Development Compounder, 1923 to 1926, he has since been with The B. F. Goodrich Co., in his present position from 1928.

Mr. Carpenter has been particularly active in the work of A.S.T.M. Committee D-11 on Rubber Products, having been Secretary since 1928 and a member of more than ten of its subcommittees including the Advisory Committee. He has taken a particularly active part in the Society's new work on ultimate consumer goods and is serving as a member of this Administrative Committee. He has served on the Society's Administrative Committee on Papers and Publications, was Vice-Chairman of the Cleveland District Committee, and served on the A.S.T.M. Executive Committee from 1931 to 1933, and again from 1941 to 1943. He has completed a term as A.S.T.M. Vice-President.

During the war he was for many months a consultant in the WPB Conservation Division. He is a member of the American Institute of Chemical Engineers, American Chemical Society, The National Society of Professional Engineers, and Fellow of the American Institute of Chemists.

Vice-President

RICHARD L. TEMPLIN, the new Vice-President, who is Assistant Director of Research and Chief Engineer of Tests, Aluminum Company of America, New Kensington, Pa., was born in Kansas and studied engineering at the University of Kansas, receiving his degree of B.S. in Civil Engineering in 1915. For post-graduate work at the University of Illinois he was awarded the degree of M.S. in Theoretical and Applied Mechanics in 1917. After two years with the National Bureau of Standards in Washington, he joined the staff of the Aluminum Company of America as Chief Engineer of Tests.

He has been very active in the work of the Society, serving on Committee B-2 on Non-Ferrous Metals and Alloys, Committee B-6 on Die-Cast Metals and Alloys, Committee B-7 on Light Metals and Alloys, Cast and Wrought, Committee E-1 on Methods of Testing and the new Administrative Committee on Simulated Service Testing. He was a member of the A.S.T.M. Executive Committee for two years. In 1934 Mr. Templin was awarded the A.S.T.M. Charles B. Dudley Medal for his outstanding paper on "The Fatigue Properties of Light Metals and Alloys." He is the author of many other technical papers and reports on work in the non-ferrous field. In addition to A.S.T.M., he is a member of the American Institute of Mining and Metallurgical Engineers, the American Society for Civil Engineers, The American Society of Mechanical Engineers, and the American Society for Metals.

New Members of Board of Directors

A. G. ASHCROFT, Director of Research, Alexander Smith and Sons Carpet Co., Yonkers, N. Y., is a native of Brooklyn, N. Y. He attended Cornell University where he received his B.S. degree in Mechanical Engineering and then received an honor graduate appointment into the U. S. Army Ordnance Department as a first lieutenant, and took graduate work at Massachusetts Institute of Technology during that time. For two years he served as Development Engineer with the Jones & Laughlin Steel Corp. in Pittsburgh and for six years as Superintendent of the Pittsburgh Diagnostic Clinic. After two and a half years with the Mohawk Carpet Mills he assumed his present connection. At present Mr. Ashcroft is Chairman of Subcommittee A-3 on Wool and Its Products of Committee D-13 on Textile Materials and has just finished two terms as Vice-Chairman of Committee D-13. He has aided in the organization of Committee E-11 on Quality Control of Materials, has given much time and effort to the Special A.S.T.M. Study Committee, and is a member of the new Administrative Committee on Ultimate Consumer Goods. He is a member of the Board of Directors of the Textile Research Institute, Inc., and Vice-Chairman of its Research Committee; a member of the Board of Directors of the Industrial Research Institute; the Research Committee of the American Association of Textile Chemists and Colorists; Chairman of the Technical Committee of the Institute of Carpet Manufacturers of America; and a member of The American Society of Mechanical Engineers.

A. T. CHAMEROY, Sears, Roebuck and Co. (Biographical Material will appear in a subsequent BULLETIN).

J. H. FOOTE, Supervising Engineer, Commonwealth & Southern Corp., Jackson, Mich., received his B.S. degree in Civil Engineering from Michigan State College, following which he was engaged in maintenance work and later in field survey and foundation drilling in connection with hydraulic projects. He then spent a number of years in electric distribution and transmission line engineering and construction. He was then engaged in electrical engineering in connection with electric lines and stations for associate companies of the Commonwealth and Southern Corp. Since 1936 he has been in charge of engineering for the Northern Division of the Commonwealth and Southern Corporation. Mr. Foote serves actively on several A.S.T.M. committees,

including B-1 on Electrical Conductors, of which he has been chairman since 1938; A-5 on Corrosion of Iron and Steel; the Administrative Committee on Standards, and was a member of the Special A.S.T.M. Study Committee. He was on the A.S.T.M. Executive Committee from 1942 to 1944. He is also a member of several ASA Committees, a Fellow of the American Institute of Electrical Engineers, member of the Engineering Society of Detroit, the Michigan Engineering Society, the Society for the Promotion of Engineering Education, and is active in the work of the Edison Electric Institute and the Association of Edison Illuminating Companies.

F. E. Richart, Research Professor of Engineering Materials, University of Illinois, Urbana, Ill., was born in Lena, Illinois. He attended the University of Illinois where he received his degree of B.S. in 1914, M.S. in 1915, and C.E. in 1922. Following his graduation he held various engineering positions; railway maintenance-of-way, public utility valuation, reinforced concrete detailing and design. For two years he was structural engineer, concrete, ship section, Emergency Fleet Corp. Since 1916 he has served in the Department of Theoretical and Applied Mechanics, University of Illinois as Assistant, Instructor, Associate, Assistant Professor, Associate Professor and Professor. Since 1926, he has been in charge of concrete research laboratory and graduate teaching in concrete. Mr. Richart has been intensively engaged in A.S.T.M. Committee work, serving for many years on Committee C-9 on Concrete and Concrete Aggregates, of which committee he is a past chairman. He has also served on Committee C-3 on Brick, the Administrative Committees on Papers and Publications and on Standards, and the Special Study Committee. He is now Vice-Chairman of the newly organized Committee E-6 on Methods of Testing Building Constructions. This is his second term as an officer of the Society, having been elected an Executive Committee member previously from 1936 to 1938. Besides his activities in A.S.T.M., Mr. Richart is a member of the American Society of Civil Engineers, American Concrete Institute (a Past-President), Western Society of Engineers, Society for Experimental Stress Analysis, and the Highway Research Board. One of Professor Richart's nontechnical activities is to serve as the Chairman of the Committee on Athletics, University of Illinois.

L. H. Winkler, Metallurgical Engineer, Bethlehem Steel Co., Inc., Bethlehem, Pa., was born in Carthage, Missouri, and attended the University of Missouri where he received his degree of B.S. in 1907 and M.E. in 1909. After his graduation he went with the Cambria Steel Co. in Johnstown and remained with this organization through its consolidation with Midvale and later in 1930 with Bethlehem Steel. He has been concerned with a variety of steel products, but much of his work has been in the fields of wire and wire products and piping and tubular products. For many years Mr. Winkler has been actively engaged in the work of A.S.T.M., particularly in Committee A-1 on Steel where he serves on numerous subcommittees and the Advisory Committee. His work on Committee A-5 on Corrosion of Iron and Steel involves particularly wire and wire products. He is also a member of the Philadelphia District Committee. He has recently been appointed Chairman of the General Technical Committee of the American Iron and Steel Institute. Other societies in which he holds membership include the American Iron and Steel Institute, American Institute of Mining and Metallurgical Engineers, American Petroleum Institute, American Society for Metals, Iron and Steel Institute (British), and the Wire Association (in 1942 he was the Mordica Lecturer in recognition of his outstanding service to this industry).

Annual Meeting

(*Continued from page 10*)

Cement, Concrete and Masonry:

Construction materials received a full measure of attention at the Annual Meeting with three sessions devoted to papers and reports. The interest in the session of technical papers on cement and concrete, as reflected by a large attendance, was in part due to the fact that the papers covered a wide range in the latest developments in research and in the influence and effect of other materials when combined with cement and concrete mixtures.

The initial paper, presented by F. B. Hornibrook, covered a study of durability and void characteristics of concrete when containing admixtures such as air-entraining types. Results indicated durability factors materially lower for concretes containing less than 3 per cent by volume of total air than for concretes containing 6 per cent or more. No trends in air-permeabilities were apparent with respect to air-entrainment.

J. W. McBurney presented results of tests on small brick panels in a paper on "Permeability of Brick-Mortar Assemblages." Only brick with initial rates of absorption less than 10 grams per minute when used with a high-quality mortar gave excellent results. The rate of leakage tended to increase with the increase of initial rate of absorption of the bricks. Other properties such as water absorption, porosity and strength appear related to permeability but only in a casual manner. Differences in textures of brick surface and permeabilities do not appear to affect water permeability. Prewetting of bricks greatly improved results and difference in bricks had more effect on permeability than difference in mortars.

"The Influence of Gypsum on the Hydration and Properties of Portland Cement Pastes" by William Lerch pointed out that varying the gypsum content of the cement will alter the rate of hydration at early ages and alter the hydration products formed. Results of tests show that strengths of many cements can be increased as much as 50 per cent and contraction on drying or expansion in water storage decreased as much as 50 per cent by use of larger additions of gypsum than now permitted by current specifications.

A decided parallel effect and relationship of the modulus of elasticity of aggregates upon the elastic properties of concrete was shown in a paper by H. A. LaRue. The relation was indicated to be not a linear function but one that may be expressed by an exponential type equation, the mortar having an important influence on the elastic properties of the concrete as well.

A considerable amount of research work has been accomplished during the last few years in the Materials Testing Laboratory of the Ministry of Public Works in Venezuela. As evidence E. V. Barrett, Chief of the Laboratory, presented his second paper in two years, covering a "Method of Particle Size Determination of Soils, Cement, Etc., by Means of a

Chainomatic Specific Gravity Balance" which permits the determination of the percentage of soil particles finer than 0.0015 mm. in 72 min. instead of 24 hr. required by the hydrometer method, as well as being more accurate and with better reproducibility.

An interesting introduction of asphalt into concrete flooring mixtures as an admixture was explained in a paper by F. O. Anderegg. It was shown that a suitable combination of cement and asphalt can produce a floor with much better cushioning effect than straight portland cement concrete and capable of giving satisfactory service. The distinctive feature is that the asphalt is present in a discontinuous phase.

There was an evening session on the ever-important subject of freezing-and-thawing tests of concrete under the auspices of Committee C-9 on Concrete and Concrete Aggregates. The feature paper was presented by M. O. Withey, entitled "Considerations Involved in the Making of Freezing-and-Thawing Tests on Concrete." Ten short contributions followed given by leading authorities of the country on this subject. A brief résumé indicated that a wide variation in the equipment used in the methods of test still exists as well as in correlation with service performance, but the expressions indicated that continued research and discussion of the problems involved should succeed in unifying and standardizing this important test method to evaluate soundness and durability.

Report Sessions:

The procedure, tried for the first time this year, of setting aside specific sessions at which there would be presented only reports of technical committees for Society action worked well and achieved one of the major objectives of having the other technical sessions devoted almost entirely to technical papers or symposiums. The reports were concentrated in three sessions, the 16th, 20th and 21st, devoted respectively to ferrous metals, paints and miscellaneous subjects; cement, concrete, lime, masonry materials, etc.; and non-ferrous metals.

Details of changes in all of the reports presented at the meeting together with a complete list of actions approved by the meeting sessions are given in a *Summary of Proceedings* just being mailed to each A.S.T.M. member together with a letter ballot asking a vote on the necessary items. Thus a member concerned with the work of a particular committee can review the *Summary of Proceedings* and determine what changes were made in the report as presented at the meeting and the additional recommendations.

Technical Committee Activities:

While all of the symposiums and some other matters discussed above were the result of planning and activities of numerous A.S.T.M. technical committees there are some additional matters which might be noted. Almost every one of the technical groups had some important recommendations to make at the Annual Meeting and these have been fully covered in the respective reports. Furthermore there is listed elsewhere in this BULLETIN the new and extensively revised tentative specifications and tests which were approved at the meeting. Also members are receiving through the *Summary of Proceedings* details of changes in the reports.

From the standpoint of number of actions submitted at the Annual Meeting, Committees A-1 on Steel, B-5 on Copper and Copper Alloys, D-1 on Paints, D-2 on Petroleum Products and Lubricants, and D-9 on Electrical Insulating Materials were in the lead. Committees A-1 and D-1 each had six new tentatives up for action but a record of the actions is well scattered throughout the committee field. Committee B-5 on Copper and Copper Alloys during the year added an appendix to eight of its important publications for sheet and strip, of a table of preferred thicknesses, and in the field of castings and ingots the new practice for preparing tension test specimens enabled the removal from several specifications of detailed requirements on test bar preparation.

Another example of the value of the A.S.T.M. technique in conducting exposure tests over an extensive period was the report of the Committee on Die-Cast Metals and Alloys of the data resulting from the various specimens it has exposed since 1929. At the same time it reported the first aging data on magnesium alloy specimens from tests begun in 1939.

The Committee on Light Metals and Alloys, B-7, has had a most intensive committee year with several new specifications for aluminum alloys now agreed on, covering sheets and plates, seamless tubing, and bars, rods and wire. They will permit the withdrawal of several older specifications.

In the work of Committee B-8 on Electrodeposited Metallic Coatings it was noted that the Subcommittee on Performance Tests has continued its atmospheric exposure tests of electrodeposited lead coatings on steel and has included the results of inspections to date in the current report of the committee.

In the relatively new work on Metal Powders and Metal Powder Products (Committee B-9) four new test methods have been substantially agreed on and intensive deliberation of a large number of proposed standard definitions of terms has resulted in agreement on about 65 of these.

Committee E-9 on Fatigue held its organization meeting in Buffalo and permanent officers for the committee were elected: R. E. Peterson, Research Laboratories, Westinghouse Electric Corp., Chairman; and O. J. Horger, Timken Roller Bearing Co., Secretary. Plans for the future work of the committee were discussed and assignments made for writing various sections of an up-to-date Manual on Recommended Practice for Fatigue Testing which will be the first item of business on the committee's schedule. The Research Subcommittee, which will take over the functions of the former Research Committee on Fatigue of Metals, also met and discussed, at some length, research problems in the field of fatigue testing on which further work is needed at this time.

The A.S.T.M. Executive Committee had recommended that the scope of the Advisory Committee on Corrosion be enlarged to take

in the supervision of all exposure test sites of the Society and the weathering of materials covered by all Society committees. These subjects were discussed at length at the meeting of the Advisory Committee. Plans to assume full charge of the test site locations are being worked out but the suggestion that the Advisory Committee expand its scope to include all weathering activities is being discussed further.

Some "C" Committee Activities

While the Committee on Fire Tests of Materials and Constructions (E-5) had developed the crib test method for determining properties of untreated and treated wood (C 160), rather extensive use of the so-called fire-tube test method developed by U. S. Forest Products Laboratory led the committee to propose a new test for determining combustible properties (new designation E 69–46 T). The test relates to the properties of the treated wood as such.

Important strides were made by Committee C-7 on Lime with agreement on three new specifications soon to be recommended to the Society covering hydrated masonry lime, special finishing hydrated lime and revision of specifications for normal finishing hydrated lime. The Committee on Gypsum, C-11, reported a comprehensive program of work with several specifications and tests to be studied in detail.

An important project in the Committee on Glass and Glass Products, C-14, will involve establishing standard methods for chemical analysis for such glass-making materials as fluorspar, feldspar, and lime. Another simplification project is an evaluation of ten methods on the durability of glass and glass containers in the hope that a reasonable number of standard tests can be agreed on.

The Committee on Refractories had an imposing list of recommendations including revisions for immediate adoption in several tests and the tentative revision of at least twelve of its existing standards. The new standard covering permanent linear change on reheating of insulating fire brick incorporates a heating schedule and gives the permissible temperature variation, the method of measuring this, and other desirable details.

"D" Technical Committees

Great activity in the group of committees with the general heading "Miscellaneous Materials" or the "D" group is evident from the extensive reports and recommendations. These were preprinted and elsewhere in the Bulletin is a list of the new tentatives which they recommend. There is much current work in many of these committees as noted from the article, "Summary of Important Current Activities in Technical Committees Especially on Standardization Projects" page 71.

In Committee D-7 on Wood an active new project was referred to, involving specifications for wood poles. There is increasing demand for additional species and the committee is extending its work to cover these.

Of the three new tentatives approved in the field of electrical insulating materials, two relate to insulating oils, one a new test for dielectric strength, the other for determining inorganic salts. This committee has a most interesting, long-time research program under way involving correlation of test results from the Method for Determining Sludge Test, D 670, with actual service. Several banks of transformers are being carefully controlled and operated under supervised conditions and there is a complete record of operation being furnished the committee. Approximately five years of operation will be required before there are sufficient data to give the necessary evaluation.

To the growing list of widely used specifications and tests established by Committee D-20 on Plastics were three new tests: one, covering tensile properties of thin sheets and films; another, the density and bulk factor of nonpouring molding powders; and a method of estimating blocking of sheet materials. Blocking is defined as the adhesion between touching layers of a material, such as occurs under moderate pressures during storage or use.

Committee D-11 on Rubber Products, whose report indicated an active year, submitted revisions of eleven tentative specifications and tests covering some of the wide range of products involved in the committee's work, for example, cellular rubber, battery containers, synthetic rubber compounds, rubber adhesives, and others. There is much activity on both research and standardization in this committee.

From the short report of Committee D-14 on Adhesives, it is evident that there is particular interest in the work on strength properties and on permanence. A new test for tensile properties of adhesives is nearing completion as are different procedures involving shear strength and impact. Procedures for evaluating the effect of chemical factors on permanence and the influence of artificial and natural light are nearing completion. The studies in this field also involve the effect of biological factors. Before long this committee will have several recommendations to make to the Society and the committee will have a continuing output of test methods and procedures for which industry has been pressing.

The rather extensive list of recommendations in the textile field includes two new tests, one covering rayon tire cord, the other the compatibility of glass yarn with insulating varnish, that is, how well the varnish wets the yarn. The 52-page report of Committee D-13 detailed a number of other recommendations.

Resulting from intensive work in the Committee on Naval Stores were three new tentatives, one covering test for water in liquid naval stores, and the others pertaining to volatile oil and petroleum spirits in rosin. The report detailed work under way involving softening point of rosin, chemical analysis and some of the newer work relating to tall oil, pine tar and tar oil, and pine oils, where considerable research has been carried out.

Six Honorary Memberships Awarded

Messrs. W. H. Fulweiler, J. O. Leech, J. S. Miller, C. S. Reeve, J. J. Shuman, F. N. Speller

Six long-time members of the Society who over the years have been extremely active in various phases of the Society's work and who have been outstanding technical leaders in industrial activities in their particular fields of work were awarded Honorary Memberships at the 1946 Annual Meeting in Buffalo. The certificates were presented by President John R. Townsend at the Annual Meeting Dinner on Wednesday, June 26, following citations by Executive Secretary C. L. Warwick. All these men, with the exception of J. O. Leech who was unable to make the trip because of ill health, were present at the meeting.

Biographical information covering some of the Society and non-Society activities of these six new Honorary Members appears below.

Frank Newman Speller

F. N. Speller, Metallurgical Consultant, Pittsburgh, Pa., was born in Canada in 1875. For many years he was Director, Department of Metallurgy and Research, National Tube Co. Educated at the University of Toronto (B.A.Sc. 1894), he was awarded his Doctor of Science degree in 1923. First employed as chemist with the city of Toronto, he later did mining engineering work, and began his long record of service with the National Tube Co. in 1901; and became metallurgical engineer in charge of research work and specifications in 1904. From 1926 until his retirement in 1939 he held the position of Director, Department of Metallurgy.

Dr. Speller has been a member of the Society since 1904 and has the unique distinction of having served on A.S.T.M. Committee A-1 on Steel longer than any other member, his affiliation having begun in 1905. He is also serving on Committees A-5 on Corrosion of Iron and Steel, D-1 on Paint, Varnish, Lacquer and Related Products, D-19 on Water for Industrial Uses, the Advisory Committee on Corrosion and the Joint Committee on Boiler Feedwater Studies. He was a member of the A.S.T.M. Executive Committee, 1927 to 1929.

Dr. Speller's name is synonymous with outstanding research work on corrosion problems and he has been awarded the Longstreth Medal of the Franklin Institute and in 1934 delivered the annual Howe Memorial Lecture of the A.I.M.E. discussing "The Corrosion Problem with Respect to Iron and Steel." He has presented a number of papers on this and related subjects and his book on "Corrosion, Causes and Prevention" has added greatly to the knowledge on this subject. Dr. Speller holds membership in numerous technical and professional societies.

Charles Snyder Reeve

C. S. Reeve, Consulting Chemist, Leonia, N. J., was born in Philadelphia in 1875 and was graduated from the University of Pennsylvania in 1897 with the degree of B.S. in Chemistry. For three years after graduation he was assistant chemist with the General Electric Co. at Schenectady, later was with the Industrial Water Company and in 1904, with the Bureau of Surveys, Philadelphia, he equipped and operated that city's first laboratory for testing asphalt paving materials. In 1906 he was appointed assistant inspector of asphalt and cement of the District of Columbia and in 1909 he was appointed to the Office of Public Roads, U. S. Department of Agriculture and was engaged in testing and research on bituminous road materials. In 1918 he went with The Barrett Co. as research chemist, in 1922 was made chief chemist to the technical adviser and then became Manager of Research and Development. He retired from the company in 1945 but is still retained as a consultant.

Mr. Reeve has been a member of the Society since 1904, his principal activities having been in the field of bituminous materials. He was a founder member of Committee D-8 on Bituminous Waterproofing and Roofing Materials (1905), also a Vice-Chairman of Committee D-4 on Road and Paving Materials, and was active in the reorganization of the Committee on Thermometers, serving as Secretary for many years. He has also served on several other A.S.T.M. committees. On the administrative side, Mr. Reeve served on the Committee on Papers and Publications from 1929 to 1933 and on the Executive Committee from 1936 to 1938.

Mr. Reeve has also been active for a number of years in the work of the preservative committees of the American Wood Preservers Association, and in addition holds membership in several other technical and scientific societies.

He is the holder of numerous patents and has written many technical papers and reports, including several in A.S.T.M. publications.

Jesse J. Shuman

J. J. Shuman, Inspecting Engineer, Jones & Laughlin Steel Corp., Pittsburgh, Pa., was born in Lancaster County, Pa., in 1869. He was graduated in 1890 from Northwestern University and immediately went to work at the South Works of the Illinois Steel Co. and was later transferred to the Joliet Plant of the same company. From 1899 to 1900 he was assistant general superintendent of Newburgh Steel Works in Cleveland, and since 1900 has been connected with Jones & Laughlin.

During World War I he participated in the work of metallurgical advisory committees to the Ordnance Department, particularly active in work on shell steel. During this period he became responsible for his company's activities on specifications. This resulted in very active participation in the work of various technical societies and he has been an active member of a great many technical committees.

Mr. Shuman has been a member of the Society since 1902, during which time he has been an active member of Committee A-1 on Steel and several of its subcommittees, serving as chairman of Subcommittee XV on Commercial Bar Steels since its formation in 1916. He has been participating actively in the work of Committee A-5 on Corrosion of Iron and Steel for many years and has also served on technical committees of Committee E-1 on Methods of Testing and on the Joint Research Committee on Investigation of the Effect of Phosphorus and Sulfur in Steel. He has also served on the Society's Executive Committee from 1938 to 1940.

He is a member and past Vice-Chairman of the Pittsburgh District Committee. Extremely active for many years in the work of the former Association of American Steel Manufacturers Technical Committees, he continued his interest through the American Iron and Steel Institute Technical Committees. In this work as well as in the work of A.S.T.M. his knowledge of the manufacture and testing of steel has been most helpful in the drafting of specifications and preparation of reports and manuals.

John Strother Miller

J. S. Miller, Consultant on Asphalt Technology, Rahway, N. J., was born in Washington, D. C., in 1876. He has been active in the testing of materials for upwards of forty years. After receiving his technical education at Cornell University, he was on the staff of the Laboratory, Supervising Architect's Office, Washington, D. C., becoming principal assistant chemist. Then he was connected with the Technologic Branch, Geological Survey, and in 1909 entered the employ of the Barber Asphalt Company as principal assistant chemist. In 1926 when the Technical Bureau of that company was formed, he was made Director and continued in that capacity until his retirement in 1942.

Mr. Miller has been a member of the Society since 1903. His first contacts with the work were in connection with his service on Committees C-1 on Cement and D-1 on Paint, Varnish, Lacquer and Related Products. He conducted the co-operative physical tests and chemical analyses upon which the original methods for testing portland cements were based and was active in the early development work of Committee D-1, such as the Havre de Grace paint exposure tests. He has served on the Society's Committee on Research and was an active member of Committees D-4 on Road and Paving Materials, D-8 on Bituminous Waterproofing and Roofing Materials, and technical committees of Committee E-1 on Methods

of Testing. He has participated in international discussions on standardization of tests for emulsified asphalts for road purposes.

Mr. Miller has been a member of the Institute of Chemical Engineers, the American Chemical Society, the American Society of Municipal Improvements and Association of Asphalt Paving Technologists. He was a vice-president of the last-named association.

JAMES OLIVER LEECH

J. O. Leech, formerly Assistant Manager, Metallurgical Division, Pittsburgh District, Carnegie-Illinois Steel Corp., was born in Pittsburgh in 1875 and was connected with the Carnegie organization from 1890 until his retirement in 1944. Following an extended period of service in the Inspection Department, he was appointed manager of the Bureau of Inspection and Tests, Carnegie Steel Co., and later was Assistant Metallurgical Engineer. He held the position of Assistant Manager, Metallurgical Division since the reorganization of the Carnegie-Illinois Steel Corp.

A personal member of the Society since 1911, Mr. Leech has been extremely active in a number of phases of committee and related work, particularly in the steel field. His affiliation with Committee A-1 on Steel dates from 1912 and he has also held membership for a number of years on Committee A-5 on Corrosion of Iron and Steel. Mr. Leech served as a member of the Executive Committee from 1932 to 1934 and has been a member of the Administrative Committee on Standards.

One of Mr. Leech's outstanding services has been in connection with the editorial makeup of a large number of steel specifications. He is an authority on steel nomenclature. He assisted in the preparation of Tiemann's Pocket Encyclopedia on Iron and Steel, particularly the section on specifications.

Mr. Leech was formerly Secretary-Treasurer of the Association of American Steel Manufacturers Technical Committees and has served for many years on the Materials Subcommittee of the A.S.M.E. Boiler Code Committee. He has also been active in the work of the American Iron and Steel Institute's Technical Committee, and was one of the Institute's representatives on the Standards Council of the American Standards Association.

Mr. Leech was a member of the Pittsburgh District Committee and has done much to promote the interests of the Society in the Pittsburgh area.

WALTER HERBERT FULWEILER

W. H. Fulweiler, Consulting Chemist, Philadelphia, was born in Philadelphia in 1880 and graduated from the University of Pennsylvania in 1901 with the degree of B.S. in Chemistry. From 1901 to 1907 he held various positions with the Philadelphia Gas Works Co., West Chester Gas Co., and Kansas City Missouri Gas Co. In 1907 he became connected with the Department of Tests, United Gas Improvement Co. and held the positions of Chief Chemist, Chemical Engineer and Consulting Chemist. From 1926 to 1936 he was Chemical Engineer of the United Gas Improvement Contracting Co., and since then has been in consulting practice.

Mr. Fulweiler has been a member of the Society since 1909 and has participated very actively in the work of a large number of technical committees. He has notable records of service on Committee D-7 on Wood, D-4 on Road and Paving Materials, D-5 on Coal and Coke, D-8 on Bituminous Waterproofing and Roofing Materials, and has been Chairman of the Committee on Thermometers since it was organized in 1921. Also he has rendered notable service on Committee E-1 on Methods of Testing since 1928. Other groups on which he is active are Committee D-3 on Gaseous Fuels and Committee D-16 on Aromatic Hydrocarbons. His term as President of the Society (1925 to 1926) was preceded by a two-year term as Vice-President and prior to that he was a member of the Executive Committee.

Mr. Fulweiler was active in technical work in World War I in connection with toluol and other explosive materials and has served on international committees concerned with materials.

He has been a member and active in the work of many other societies covering a wide range of interest and is a past-president of the Rittenhouse Astronomical Society of Philadelphia. He was awarded the Beale Medal in 1908 by the American Gas Institute, the Grasselli Medal in 1922 by the Society of the Chemical Industry; and the Silver Medal, Sesqui Centennial International Exposition in 1926.

40-Year Members

CONTINUING the policy of recognizing those members who have been affiliated with the Society for 40 years there were awarded to 19 companies and individuals at the Annual Meeting in Buffalo certificates testifying to their four decades of continuous membership in the Society. Including those recognized this year the total 40-year membership now has reached the 105 mark. The 1946 list follows:

Duff A. Abrams
American Bureau of Shipping
American Steel Foundries
Anaconda Copper Mining Co.
Cornell University Library
Oliver C. Cromwell
Charles E. Fuller
Addison F. Holmes
The Iron Age
Harry McCormack
Norfolk and Western Railway Co.
Pittsburgh Plate Glass Co.
Paint and Varnish Division
Ernest John Russell
Earl B. Smith
Southern Pacific Co.
Richard S. Suydam
United States Testing Co., Inc.
University of Kansas Library
University of Melbourne Library

For a complete list of prize-winning photographs and news of the Apparatus and Photographic Exhibits see page 57, 58.

"Oil Quenching of Steel"

First prize-winning photograph, non-professional, in the Fifth A.S.T.M. Photographic Exhibit, by Edward P. Truhn, Cornell Aeronautical Laboratory.

The Challenge of National and International Affairs to the Engineer

Annual Address by the President

J. R. Townsend[1]

June 26, 1946

THE time-honored method of determining future trends is to assume that things will keep to their courses until a serious disruption causes a change in direction. By going backward a few years, it is seen that our people are looking more and more to government for the management of affairs. Recent events reveal that this may become a more and more entrenched habit of our people. All of us are mindful of the tremendous technical advances that have taken place. It now behooves us to take stock and determine if the politician and the legislator alone can be depended upon to handle the problems that arise in the path left by scientific advances. Certainly, they must be assisted by technologists to a comprehension of these new forces. Neither the engineer nor the politician alone can be expected to solve these problems. I wish to plead therefore for a more active participation of the engineer in national and international affairs.

It is clear that the role of the politician is to get people to do things. They collect and add direction to public will. They espouse and sharply define issues and direct public affairs.

The time-honored position of the engineer or technologist is to do the staff work. The politician looks to him for information but distrusts his advice on human affairs. The physical laws with which the engineer is most familiar are constant. The politician regards the engineer as living in an ivory tower and feels that the engineer's standards are too rigid. The rules that are used in human affairs must be elastic and adjustable to the circumstance.

The engineer, on the other hand, frequently has contempt for the politician. This contempt leads to distrust and avoidance. These, of course, are symptoms of lack of comprehension and appreciation of what the politician can do in the practical sense of getting people to work.

Out of this emerges the duty of every engineer to make his contribution to political thought. The A.S.T.M., because of the nature of its work, is particularly fitted to spearhead and show leadership in its contacts with the Government on technical matters. The engineer's most direct contact with political thought is through his client or his management and his membership in technical societies. He should think of management problems, public relations, developments in political and physical science and use every opportunity to apply his brains to the management of human affairs at his own level.

I have never pretended to be anything but an engineer. It is continually intriguing to me to solve engineering problems, and I have been stimulated by the human experience of working in a constructive and cooperative way with many engineers. There is a special significance to this. The training of the engineer should be in line with what Thomas Huxley had to say of education, namely, "the instruction of the intellect in the laws of nature under which name I include not merely things and their forces, but men and their ways." Now, the engineer can measure things and their forces; can define and describe stuff; but only much experience and association with many human beings will teach of man and his ways.

But engineering is not always looked upon too favorably by the intelligentsia of science. To them it seems a debased art, fortuitous at best, based on compromise and not always upon rigorous and fundamental thinking. To the man on the street, engineering is taken for granted. This impression is nearly always created by *good* engineering, since the best engineering solution is a simple one and on the face of it this looks easy. An engineer is thus seen to be a simple fellow, dealing with practical affairs with what means he has at hand, and satisfied with an agreeable solution.

There is more here than first meets the eye. The present situation in the world presents a soul-searching problem. We are overcome with *fear* and its partner, *distrust*. We feel insecure socially, politically, and economically. Each day there is revealed in the press new and more fearsome weapons. Can we trust the present leaders of men with such inexorable forces? In the field of commerce our economy is threatened by pressure groups, led by dynamic but selfish men. Despite arresting protests, these leaders tend to deprive us of choice. No opportunity is presented for consultation and negotiation, but instead we have the unpleasant spectacle of unrestrained human nature. Yet, the World's work requires that men be organized, marshalled, directed, and led if our civilization is to succeed.

I am not suggesting here that these problems be turned over to

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[1] Materials Engineer, Bell Telephone Laboratories, New York, N. Y.

the engineer. We engineers are a modest lot. Experience has chastened and taught us through our many mistakes that trouble is to be foreseen and that human reform is slow at best. But material civilization is moving on. There are many new things to be assessed and weighed. No longer can we solve our engineering problems with Newtonian mechanics and elementary chemistry. On the surface it seems fashionable for our young engineers to be concerned with electronics, plastics, supersonics, atomic physics, and the like. An engineer cannot be a master of all of these fields of activity. However, he must acquire knowledge of their possibilities and limitations and understand how they may be adapted and applied to human use.

Please do not misunderstand me. It is not necessary for an engineer to be skilled in every subject under the sun. Capacity will automatically limit this for the individual. I do not feel either that the engineer should follow all of the sociological and economic fads of the present. A well-balanced ration of thinking, as applied to human needs, will take care of this.

The way of the legislator, and public servant, has not been made any smoother by recent events either. It has long been the tradition in America that social and economic reform can be brought about by political reform. This has involved the time-honored process of voting out the "ins." Alas, this will provide little in the solution of our problems. Knowledge of political philosophy alone and its practical application, while an important factor in the field of affairs, is not sufficient and cannot solve such problems as now beset all of us. Science and technology have provided us with potent things that must be directed for the benefit of *all human* kind. We thus have a triumvirate: *Government*, *business*, and a third party who is a master of technology. I submit that this third party should be the engineer.

Throughout history, the most potent force for binding men together has been fear. The striving for security has kept families, tribes, and nations together. We, in America, have populated a new continent, possessing good climate, rich lands, and great mineral wealth. The exploitation of this natural wealth, under our private enterprise system, has brought security and prosperity. We engineers have had good clients. America has more engineers than any other nation.

It was my privilege last spring to visit defeated Germany and to investigate at first hand its scientific and engineering methods. My approach to this problem was objective. I prepared myself for the trip by setting forth in my mind the principal problems of engineering materials in the field of communications which was to be my specialty. It would thus be possible to recognize and compare their methods of solution of these problems with our own. This proved in experience to be a fruitful approach and much of importance was revealed. But the over-all sociological picture presented by Germany was overpowering and especially significant in our present discussion.

The German system required a long apprenticeship and hence their ordinary workmen were highly skilled. This had the effect of reducing the need for supervision, detailed drawings, process specifications, and engineering. There were many technically trained people in Germany, and since there were few head positions to aspire to, there was much competition in the lower technical ranks and those that won out were very competent people indeed. Whereas this system produced much individually fine work, their production methods had much less output than ours. They had little knowledge of high-speed production machinery and hence they had to have recourse to more and more hand labor. This led to the drafting and use of slave labor. Every plant I visited had from ten to eighty per cent such slave labor. In spite of the many new devices and the excellent utilization of science, Germany was defeated. This defeat was due more to logistics, to the overwhelming weight of our arms, and thus to our industrial production and productive capacity, than to the use of new weapons.

There is here a most interesting paradox which caused me much speculation. They had excellent science, an ordered society, autocratic rule, scientific direction; yet they failed. The answer lies in this. There was a profound difference between the German and the American ideology. The Germans had authority, obedience, efficiency, and a ruthless scientific logic. There was no place for sentiment or humanity in their philosophy. The American philosophy, while subject to close Governmental control and discipline, yet permitted self-determination. We harmonized the principle of self-determination with efficiency by invoking the team spirit where every man working together can contribute his best. The Germans by their use of authority, slave labor, and utter disregard for human values, completely ignored psychological for material values. Our system provided the hope for human development. Theirs contained no hope but for the elite. It should be clear that our system provided freedom of choice, thus stimulating achievement. Human values were not subordinated to mechanical efficiency. Herein is a profound lesson.

It is folly to suggest that only the technical man should manage or direct public affairs. Human affairs must be settled by compromise and adjustment. The answer is never a rigorous one except in the broad principles based on the proper human selection of values. The rigorous method of the scientist will not do. On the other hand, the legislator does not understand or appreciate the nature of modern industrial processes or developments. He needs the help of the technologist to reveal the facts so that he may assess the human values.

Here, then, is the problem in simple terms. The Nazi ideology had used science wrongly. We must assess the facts of science and set the proper human values. I now ask you, why not have the engineer complement to a much greater extent the thinking of the legislator?

In a significant article by Morris L. Cooke in the September, 1945, issue of *Mechanical Engineering*, it is demonstrated that the engineer, while being the best equipped to adopt such a role, is in fact less

concerned with public affairs than almost any other class of individual. The situation thus portrayed is shocking indeed.

Among all of the technical societies, it seems to me that A.S.T.M. is the best training ground for the engineer to acquire the experience needed in compromise and evaluation of the facts of science in human affairs. The work of our Society deals in devising and adopting methods of test. Only by such tests can we judge the value of an improvement or compare two or more products for a specific use. These tests are adopted only after very careful study, using the results of a number of investigators. Modifications are made and compromises are permitted so that all concerned may find it convenient to carry out the tests. These tests are then applied to a product, and tolerable limits are set by conference between producer and consumer and a new standard is born. Commercial selfish interests are in the background during this process. The steps are clear: first, recognition of a need; then investigation of facts, compromise and adoption. Experience provides limits and these are adjusted to form a new standard. All of the work is voluntary. There is no coercion.

During the war, a vast number of standards, emergency standards, and emergency alternate provisions were devised and promulgated. Many of our specifications and tests were used without change by the Government. Some were developed at the specific request of the Government to meet some special need. Many of our members advised Governmental bureaus on a host of subjects. This work was in the best American tradition—cooperative, informative, constructive, and freely given.

In the philosophy of the future work of A.S.T.M., cooperation with Government departments looms large as well as with the scientific and engineering work of the other technical societies. Our Society is taking an active interest in this work and will be prepared to supply engineering tests as may be needed. It is likely that legislation will be necessary to bring the advantages of standardization to the ultimate consumer. Members of our Society should be prepared to assume the responsibility of the third member of this new triumvirate of Government, business, and technology.

As individual engineers and as members of A.S.T.M. it is our duty to ourselves as Americans, and to our profession as engineers, to take a more active part in public affairs. We can all help no matter where we are located or how situated. We can aid our fellow citizens and our legislators to assess the facts of modern technology and to assist in the comprehension of true human values so that our fellow citizens may, in the exercise of the privilege of selecting what they think best, have the opportunity to use the best intelligence possible.

In conclusion, may I offer one more quotation from Thomas Huxley:

"And, if the evils which are inseparable from the good of political liberty are to be checked, if the perpetual oscillation of nations between anarchy and despotism is to be replaced by the steady march of self-restraining freedom; it will be because men will gradually bring themselves to deal with political, as they now deal with scientifical questions; to be as ashamed of undue haste and partisan prejudice in the one case as in the other; and to believe that the machinery of society is at least as delicate as that of a spinning-jenny, and as little likely to be improved by the meddling of those who have not taken the trouble to master the principles of its action."

Standardization and the Antitrust Laws[1]

By James V. Hayes[2]

This discussion and interpretation of recent changes in the attitude of the courts and the Federal Trade Commission toward standardization was presented before the first meeting of the Conference Committee of Staff Executives of Member Bodies and Associate Members of the American Standards Association March 7. Executives of 35 trade associations and technical societies that are members of the Association attended the meeting.

The author speaks with authority on his subject, having made special study of the application and interpretation of antitrust laws to standardization activities as carried on in industry. The law firm with which he is associated has long specialized in antitrust legislation and in trade association work.

As a result of the first World War and the tremendous demands made upon industry, standardization became an increasingly important cooperative activity of industry, and the Department of Commerce lent all its influence to promoting industry activity in this field. In 1922, Herbert Hoover, as Secretary of Commerce, requested an informal opinion of the Attorney General as to the legality of trade association activity in general and included in his request the following question:

"May a trade association, in cooperation with its members, advocate and provide for the standardization of quality and grades of product of such members, to the end that the buying public may know what it is to receive when a particular grade or quality is specified; and may such association, after standardizing quality and grade, provide standard form of contract for the purpose of correctly designating the standards of quality and grades of product; and may it standardize technical

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[1] This paper was published in the April, 1946, issue of *Industrial Standardization*, the organ of the American Standards Association, and while it is normally not the policy of the Society's Administrative Committee on Papers and Publications to authorize publication of material that has been printed elsewhere, the subject is one of such importance that it was felt very desirable to make it available to every A.S.T.M. member and BULLETIN reader.

[2] Member of the Firm, Donovan, Leisure, Newton, Lumbard, and Irvine, New York, N. Y.

and scientific terms, its processes in production, and its machinery; and may the association cooperate with its members in determining means for the elimination of wasteful processes in production and distribution and for the raising of ethical standards in trade for the prevention of dishonest practices?"

This was the first occasion upon which any authority had ventured an opinion on the legality of standardization, or rather, it was the first occasion upon which legality, theretofore assumed, had been questioned. The Attorney General did not give a very satisfactory answer to Mr. Hoover's inquiry in the light of subsequent developments. He said:

"I can now see nothing illegal in the exercise of the other activities mentioned, *provided always* that whatever is done is not used as a scheme or device to curtail production or enhance prices, and does not have the effect of suppressing competition."

It is obvious that with such hedging almost *any* group activity would be proper under the antitrust laws.

Accepted as Green Light for Standardization

Be that as it may, this correspondence between the heads of the Department of Commerce and the Department of Justice was accepted as giving a green light to technical standardization activity by industry groups and, therefore, for several years, it was often referred to by the Department of Commerce in its efforts to encourage industry activity in this field.

The first, and almost the only, mention made by the Supreme Court of standardization activity occurred in 1925 in the familiar case of *Maple Flooring Manufacturers Association* versus *United States*.[3] In that case a price-fixing conspiracy was charged against maple flooring manufacturers. One of the means alleged to have been used to effectuate the conspiracy was standardization of grades of flooring. A decree against the Association was entered by the district court, but the decree made no reference to the standardization activities of the Association. On appeal to the Supreme Court, the Court in reversing the decree of the lower court took notice of the Association's standardization activities. The Court said:

"The defendants have engaged in many activities to which no exception was taken by the government and which are admittedly beneficial to the industry and to commerce; such as cooperative advertising and standardization and improvement of the product."

In its discussion of the facts it made no other reference to standardization. At the least, the Court thought standardization beneficial to industry and commerce. However, it is important to note in this case, as I shall point out more fully, that the Association was found not guilty of any price-fixing conspiracy.

In the years following this decision, standardization by joint action of industry thrived, and as far as can be determined no question was raised as to its legality.

Standardization Legal; Illegal when Used for Illegal Purposes

In 1923, a consent decree was entered in a case in which the government complained against the *Tile Manufacturers' Credit Association, et al.*,[4] alleging a price-fixing agreement. The complaint listed 17 practices as the subject of the conspiracy. Among these was the allegation that the defendants conspired "to standardize the shapes, etc., of tile made, eliminating many now sold, and establish the use of standardized catalogs of said association (catalogs now being prepared)."

The decree provided that nothing therein should be deemed to restrain the defendants from maintaining an association for certain enumerated purposes including "to secure and maintain the standardization of quality and of technical and scientific terms, and the elimination of nonessential types, sizes, styles, or grades of products."

On the other hand, the consent decree entered *versus* the *Carpet Manufacturers of America, Inc.*, in New York in 1941 prohibited agreements "to limit the kinds, quality, grade, quantity, or the number of lines of merchandise to be manufactured and sold."

The conclusion to be drawn from these cases was that standardization when used as a means to further a price-fixing conspiracy or a restraint of production or an elimination of competition was illegal, whereas standardization, as such, was unobjectionable. This conclusion was buttressed by various pronouncements of the Federal Trade Commission, the chief one being a statement by the chairman of the Commission, made in 1931, that "in no matter has the Commission ever held standardization of commodities by members of an industry to be violative of any of the statutes it has the duty of enforcing."

Perhaps the F.T.C. has had a change of heart. Since 1938, hardly a complaint involving trade associations has been issued by the Commission which did not allege standardization as one of the means utilized in advancing and perfecting the alleged conspiracy.

The convenient division of the authorities theretofore thought possible was, however, made somewhat questionable by the *Milk Can Institute* case. The original complaint in that case was issued in June, 1934, under the title of *Keiner Williams Stamping Co., et al.*[5] It contained an allegation that in furtherance of an alleged competition-suppressing and price-fixing conspiracy the respondents (members of a trade association) had standardized the construction of milk and ice cream cans so that they were of uniform material, weight, and general construction. Following this allegation appeared a caveat to the effect that "The Commission is not here complaining against the alleged standardization as such, but only against the use thereof as a means of carrying out the price-fixing conspiracy hereinbefore charged."

No decree was ever entered on this complaint and in July, 1941, it was dismissed without prejudice and a new complaint was issued. The matter was now entitled "*In the Matter of the Milk and Ice Cream Can*

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[3] 268 U. S. 563 (1925).

[4] S. D. Ohio, 1923.

[5] Docket 2199.

Institute, et al."[6] The amended complaint also alleged a price-fixing conspiracy and as one of the activities engaged in "pursuant to and in furtherance of the aforesaid combination," the elimination of models and styles of cans, the change in designs of cans and other standardization of products independently of and beyond any requirements for standardization prescribed by the Federal or State Governments "*for the purpose of eliminating competition in the attractiveness of their products to buyers.*" Significantly the caveat contained in the original complaint was missing from the amended complaint.

F.T.C. Attacks Standardization as Such

It is particularly to be noted that the language quoted indicates that for the first time the Federal Trade Commission was attacking standardization as such. Any standardization program naturally results in some elimination of competition of attractiveness of product and in some restraint of production in that it standardizes the product available to prospective purchasers. But that end has always been thought to be a justification for standardization. In other words, the benefit of standardization to the consumer arises from the very fact that the product is standardized, enabling him to buy with confidence and giving to him the advantage of low prices due to savings in manufacturing costs and interchangeability of parts. These advantages have long been thought to far outweigh any incidental restraint of production arising from the elimination of special items.

Following hearings in the *Milk Can* case, the Commission made findings of fact and conclusions of law. Among these was a finding that the respondents *had* engaged in standardization and simplification "as a further means of establishing a basis upon which price differences might be eliminated, and for the purpose of eliminating competition in the attractiveness of their products to buyers." The findings set forth an example of the standardization activity of the Institute which, so far as appears, is a typical association activity. The specific language of the findings is:

> "At a meeting held June 14, 1932, the respondent, D. S. Hunter, as commissioner, called attention to the desirability, in the work of standardization, of eliminating if possible some styles and sizes of milk and ice cream cans, especially those for which there was a small demand, and also that consideration should be given to standardizing the weight, as well as the gages, of the various styles and sizes of cans. The Commissioner was instructed to communicate with members to determine what lines of cans could be eliminated. Subsequent thereto, at a meeting held on July 12, 1932, the committee on standards submitted a table of standardization of various styles and sizes of cans by weight and on motion made, seconded, and carried, this recommendation by the committee on standards was adopted by the respondent members. Subsequent to that time, the committee on standards had made various recommendations with reference to gages and weights of milk and ice cream cans which were adopted by the respondent members."

The order to cease and desist entered by the Commission pursuant to the hearings and findings made no specific reference to the standardization activity of the Institute. It did specifically prohibit the members of the Institute from fixing or maintaining prices or adhering to such prices and it prohibited a sales and price-reporting service and a freight equalization system used in connection with price fixing, etc. The decree did contain a general paragraph prohibiting the members from engaging in "any other practice or plan which has the purpose or effect of fixing or maintaining prices...."

The Institute and its members appealed from the order of the Commission to the Seventh Circuit Court of Appeals and on January 7, 1946, the Circuit Court rendered its opinion upholding with minor modifications the Commission's order.

The court treated the standardization activity of the Institute and its members as evidence of the conspiracy. The court noted that the only basic question before it was whether the members had conspired to fix prices. The court discussed the standardization activities of the defendants as being one of the pieces of evidence supporting the Commission's finding that the defendants had acted in concert and by agreement.

There was no discussion or intimation by the court to show that it thought that standardization by itself would result in a restraint of trade, but its whole discussion was directed to the point that the members had agreed on standardization and that this agreement supported the Commission's finding of a conspiracy. The court said:

> "We think it is true that they were standardized in the instant situation, but this was the result of the activities of the Institute and its members. In fact, there was a continuing effort and urging on their part that the cans be manufactured in uniform classifications. It may be, as argued, that much of this effort was to comply with various governmental regulations and for health purposes, but the fact still remains that it was easier to reach the goal of uniform prices on a standard product than on one which was not. The meticulous effort disclosed by the record by which petitioners standardized their products is also a strong circumstance in support of the Commission's findings that their activities were the result of an agreement."

It is true that in the *Milk Can* case there were the usual other factors present which theretofore had been present in every case where the Commission had attacked standardization, namely, a price-fixing conspiracy, restraint of production, and elimination of competition.

The language of the Federal Trade Commission findings was that a table of standardization "was adopted" by the members of the Institute. There is nothing either in the findings, the order to cease and desist, or the decree of the Circuit Court of Appeals to indicate what the members did when they "adopted" the table of standardization recommended by the Milk Can Institute Committee on Standards. It would seem fair to conclude that what was complained of was merely the fact that the members agreed to adopt certain sizes, styles, and types of cans as standard and that there was no agreement to adhere to the standardized line. If there had been both, the Commission and the Circuit Court of Appeals had many authorities on hand to support a holding that such activity was a restraint of trade. Since no reference was made to an agreed re-

[6] Docket 4551.

straint it seems fair to assume that there was none.

On the foregoing assumptions one must inevitably conclude that the court utilized an agreement theretofore considered perfectly legitimate, namely, an agreement on what the standard shall be, to convict the defendants of a price-fixing conspiracy. Therefore, under this case, no longer will legality of standardization depend upon whether the program is misused and made a part of restraint of trade, but on whether the Association happens to be prosecuted for a restraint of trade arising from any one or more of its other activities.

Prior to the *Milk Can* case, most lawyers active in the trade association field felt safe in advising trade associations that activity in the field of standardization was legitimate as long as the standards were arrived at on sound engineering and technical considerations (as well as considerations of safety and public health) as long as the activity was carried on in good faith and without any intent to fix prices, restrict production, and eliminate competition, and finally, as long as there was no agreement express or implied among the members to adhere to the standards agreed upon.

It is to be noted that the Attorney General, back in 1922, based his clearance of standardization on the premise that the standards were voluntary and that any member was left free to adhere to or depart from standards as he might from time to time see fit. It was never thought to be illegal to agree on what the standards should be. In fact it is obvious that no standardization can be carried on except on the basis of agreement as to what the standards shall be.

Find Danger in Agreement on What Standard Shall Be

Now, however, it appears that there is danger even in an agreement on what the standard shall be in that the Federal Trade Commission and the courts will accept that agreement as evidence of agreement on other matters upon which the law forbids competitors to agree.

I mentioned above that most Trade Commission cases since 1941 against trade associations have contained an allegation that standardization was one of the means utilized to promote the conspiracy. It is interesting to note in the *Milk Can* case that the Commission found that the standardization work was done "as a further means of establishing a basis upon which price differences might be eliminated and for the purpose of eliminating competition in the attractiveness of their products to buyers." This limitation does not mean much when one remembers that the Commission can always make such an allegation after the fact. In other words, if a restraint of trade exists, a standardization program can always be pointed to as a means of effectuating the restraint. There never has been any doubt that price fixing or restraint of production is facilitated by uniformity of product.

The only comforting thing about the *Milk Can* decision in the Seventh Circuit Court of Appeals is that the court deleted the general catch-all provision of the order to cease and desist, thereby leaving the order without any possible prohibition against the standardization activity of the Institute.

Summary of Present Legal Status of Standardization

To summarize the present state of the antitrust law as it applies to standardization: (1) the activity is legitimate in the absence of any agreement by the participants to limit their production to the standard items; (2) if an association or other group is prosecuted or complained against for a conspiracy to restrain trade either by fixing prices, restraining production or eliminating competition, or any of the variables or combinations thereof, it is almost certain that their standardization activity will be cited as evidence of the conspiracy; (3) it is highly improbable that a trade association or other group will ever be prosecuted or complained against solely for carrying on a standardization program in the absence of any other restraint of trade.

Since the attack on standardization in the *Milk Can* case was accompanied by allegations of price fixing and restraint of production by means of other more serious methods, one cannot state positively what the result would be of a complaint addressed to standardization alone. I do not believe that a court would hold that trade and commerce had been restrained by the incidental elimination of "competition in the attractiveness of products to buyers." I think the courts would hold that such restraint, if any, was a restraint of trade under the rule of reason.

Whether the Federal Trade Commission will ever bring a complaint based upon that type of restraint alone and what conclusion the Commission would reach remains to be seen. The language in the *Milk Can* case indicates that the Commission believes standardization for the purpose of eliminating competition in the attractiveness of their products to be a violation of law. It is impossible to tell from the *Milk Can* case whether the Commission really believes that. One word of warning is appropriate. If the Commission should bring a proceeding and issue a cease and desist order based upon such a restraint, it is doubtful whether the court would upset an order of the Commission in view of the well-known rule that the Commission's conclusions are conclusive on appeal if supported by substantial evidence.

"Standardization" Needs Exact Definition

One of the greatest sources of confusion and doubt on this question of the legality of standardization arises from the looseness with which the term "standardization" has been used. Perhaps I should have defined the term at the beginning of my talk, but it seemed to me that it would be more advisable to leave you with a proper, exact definition. A standard is a "definition of a product or process with reference to composition, construction, dimension, quality, operating characteristics, performance, nomenclature, and other like factors." And standardization, as I have used it here, is "the formulation of such definition or standard." Standardization has nothing to do with an agreement to adhere to the standard so formulated and it behooves every association engaged in this type of activity to make clear beyond question both to its members and to the public gen-

erally that the promulgation of a standard or standards by it does not preclude any member or nonmember from making his own determination as to whether or not he will manufacture in accordance with the standard.

Of course, it is natural that a manufacturer who has taken part in setting up standards will in all probability manufacture in accordance with the standards. As long as each manufacturer freely, voluntarily, and in good faith does this, whatever restraint of trade results is incidental and is far outweighed by the economic benefits accruing to consumers, distributors, and manufacturers from a standardization program. It is only where the freedom of the individual has been taken from him by an agreement express or implied to adhere that the restraint becomes direct rather than incidental.

Voluntary Nature of Standardization Eliminates Use of Compulsion

A natural corollary of the voluntary character of standardization is that an association engaged in standardization activity take no steps to compel compliance with its standards. This, of course, does not mean that the association cannot investigate to see whether its standards are being followed—for the purpose of ascertaining and verifying the validity of the standards and the possible necessity of amendment. Such activity is proper if carried on in good faith. Members are not likely to be confused as to the real purpose of any investigation along these lines.

How the Party-at-Interest Procedure of A.S.A. Affects Legality

There is a question related to the voluntary use of standards of special interest to this group. This question has not yet been answered by legal decision, but in my opinion it can have but one answer. That question is, "Does the procedure of the American Standards Association, in which all parties at interest are represented in the development of a standard, change the picture as far as the legality of a standard is concerned?" Although there has been no legal ruling on such a question, it is my opinion that this procedure does give a standard greater protection than if the standard is developed by a private group. If a standard is arrived at after consulting not only the interests of the manufacturers but also of the marketers of the product, of the consumers of the product, and of the government agencies, if any, which may be interested in the use or disposition of that product, then whatever restraint results from the adoption of that standard would, in my opinion, be reasonable. I do not believe it could ever be successfully attacked.

One should not infer, however, from the fact that a government agency has participated in any way in the adoption of a standard that the standard so adopted carries with it any license to violate the law in the use of that standard. This is true even though the government agency might request that the particular wrongful conduct be done. If, for example, a government agency should ask an industry to adhere to the standard and not to manufacture articles which do not comply with the standard and if, pursuant to such request the industry should so agree, the agreement thus made would still be subject to attack. The reason is that no government official no matter how highly placed has the authority to authorize any individual or group of individuals to violate the law or to invite them to do so.

Confusion Equally Great on Status of Simplification

Finally, I should say a word about simplification. The confusion on this subject is even more extensive than on standardization and again arises primarily from the wide variety of activities that has been called simplification. Everything that I have said regarding standardization applies to simplification, as I define simplification.

Simplification is "the formulation of standard product lines consisting of types, sizes, shapes, grades, colors, and varieties of product most frequently demanded by consumers."

Same Limitations Apply to Simplification

What I have just defined as simplification is sometimes called type standardization. It has also been defined as an agreement to eliminate in accordance with agreed product lines. The same limitations that apply to standardization also apply to simplification. It is legitimate for an association to formulate standard product lines and as an integral part thereof for competitors to agree on what standard product lines should be. Just as in the case of standardization, it is illegal if the program is misused in order to fix or raise prices, restrict production, or eliminate competition, and it is obvious that an agreement by the participants in such a plan to adhere to the standard product lines and to limit their manufacture thereto is an illegal restraint of trade.

What Is New in Science and Engineering[1]

Address by Everett S. Lee[2]

I approach the subject of "What Is New in Science and Engineering" from the standpoint of measurements. And I have chosen to describe new advances wherein the measurements are of interest to you in the testing of materials.

I do not have to prove to you the fundamentality of measurements in bringing new developments into being. There is a romance in their application which is known and appreciated by those who are privileged to use them. Where measurements and measuring instruments and equipments are present to bring into being certain knowledge, there is progress. Where measurements and measuring equipments are not available, there is uncertainty and confusion. We in the A.S.T.M. appreciate this. We must continue daily in our work to bring to others a recognition of the fundamentality and importance and need of measurements, that progress will be more certain. I continually quote the Lord Kelvin statement in this regard, and as I have had opportunity to bring this statement to many, they have universally attested to its truth. And this truth is the foundation and the structure of advancement and order.

> "I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of Science, whatever the matter may be."
>
> Lord Kelvin

I like to think of these measurement contributions as stories, for they are the life stories of the men who lived them. And in many instances they are stories of young men, for it is from the young men with their freedom of thought unfettered by barrier inhibitions that most of our new ideas come. And they are also the stories of older men, for it is the older men who must appreciate the ideas of the younger men and see that they are given opportunity for progression to a successful conclusion. And thus the close association of the young men and the older men form a team of high accomplishment.

Photoelectric Recorder

I like to tell the story of the photoelectric recorder for it started long ago when a chart record of certain tube characteristics in radio receivers was required. At first the record was obtained from an auxiliary pointer made to follow manually the pointer movement of an indicating instrument. Then, from an idea of a young engineer, an optical system combined with phototubes replaced the manual operation, and the photoelectric recorder was born. Essentially it produces a continuous record on a chart of the motion of any of a wide variety of basic elements, electrical or mechanical, capable of carrying a small mirror. During the war there were many applications of the photoelectric recorder, particularly where only very small values of current or voltage were available for the necessary measurement. During the war it was said the sun never set on the photoelectric recorder. There were wide applications in the degaussing of ships. From these measurements came a most certain means of measuring magnetic flux, and a new fluxmeter was born. This has had extensive application in the measurement of magnetic flux from magnets. Also from this work came the mag-

Fig. 1.—The General Electric Photoelectric Recorder.

Essentially it produces a continuous record on a chart of the motion of any of a wide variety of basic elements, electrical or mechanical, capable of carrying a small mirror.

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[1] Address before the A.S.T.M. Northern California District, San Francisco, Calif., January 29, 1946.

Affiliated with the General Electric Co. since 1919, and Engineer in the General Engineering Laboratory for some fifteen years, Mr. Lee has been very active in the work of several professional and technical groups. In A.S.T.M. he has served on Committee D-9 on Electrical Insulating Materials since 1923. Chairman of the Engineers' Council for Professional Development, he is also the Vice-President of the United Engineering Trustees, Inc.

[2] Engineer, General Engineering and Consulting Laboratory, General Electric Co. Schenectady, N. Y.

Fig. 2.—From These Measurements Came a Most Certain Means of Measuring Magnetic Flux, and a New Fluxmeter Was Born.

netometer for measuring small values of magnetic field such as to a sensitivity of 1 milligauss. I have learned sensitivities of 0.1 milligauss are required in some present measurements. I believe we can produce such an instrument.

One of the latest derivatives from the photoelectric recorder in the field of materials testing is the yarn diameter recorder, which optically and electrically measures and records the diameter of yarn passing through it. Yarn sizes from No. 3 to No. 24 are accommodated at a yarn speed of 72 in. per minute. Results are recorded to 0.010 ± 0.005 in.

In the textile industry the weft straightener control for automatically straightening the cloth at the end of its passage through the mill has come from the photoelectric recorder technique and experience. Here, photoelectric tubes located above the cloth as it goes through the mill see the blinks of light from light beams under the cloth, to produce a balance when the cloth is straight. In this operation, cloth of 100 threads per inch going through the mill at speed of 100 yd. per minute cause the electronic tubes to see as many as 6000 blinks per second. It is the ability to thus operate at these enormously high speeds that gives the electronic tubes one of their great attributes and allows them to give performance which cannot be obtained in any other way. The applications of electronic tubes to industrial processes are increasing and the days to come will see augmented developments and applications to bring more of certain products into being at higher speeds.

Fig. 3.—One of the Latest Derivatives from the Photoelectric Recorder in the Field of Materials Testing Is the Yarn-Diameter Recorder.

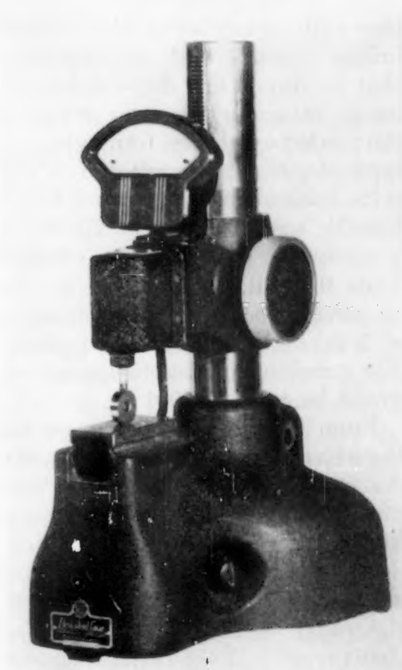

Fig. 4.—Electric Gages Through Their Outstanding Performance Are Well Established in Industry and New Applications Are Constantly Increasing.

Electric Gage

Electric gages through their outstanding performance are well established in industry and new applications are constantly increasing. The attributes of the electric gage are that it is reliable, that it will measure dimensions of small parts with high

accuracy and precision, and that it can be applied to continuous processes with advantage. In the early days we had the problem of providing a gage to measure accurately and quickly the parts for the monitor top electric refrigerator—the first sealed-in-steel design. The fits had to be to exact dimensions within close tolerances. The electric gage resulted and performance both of the electric refrigerator product and of the electric gage is a testimony to its remarkable ability.

We had the problem of choosing a gage circuit. A capacitor type of circuit is intriguing, but our experience with capacitors in high-voltage bridge circuits had demonstrated that for day-in and day-out factory usage, capacitor types do not have the needed reliability. An inductive type of circuit was selected. This is the basis of the Electrolimit Gage. Electric magnification of 20,000 to 1 represents good practical design. Thus 0.1 mil displacement at the measuring foot produces a motion of 2 in. of the instrument pointer. The precision of this measurement would be to ± 0.00001 in.

From the early electric gages for the measurement of small parts, the designs have been extended into many other fields. Plating gages for the measurement of the thickness of any coating on steel are available for coating thicknesses in the range 0.0001 to 0.1 in. The measurement of steel pipe thickness has always been a problem due to surface roughness, but the electric gage can now measure pipe thicknesses from the outside up to $\frac{1}{4}$-in. thickness with an accuracy of 10 per cent for pipe up to $1\frac{3}{4}$-in. diameter, and up to $\frac{1}{2}$-in. thickness for 4-in. diameter pipe. For measurements to give a percentage deviation from a standard value, the electric gage is particularly well adapted.

In the field of continuous measurement the electric gage finds great usefulness. In the strip steel mills the application of the flying micrometer, together with other new design features, has seen the speed of strip through the mill increase from 300 ft. per minute to 1500 ft. per minute and on up to 4000 ft. per minute. A new mill is in design for speed of strip through the mill of 5000 ft. per minute. A new gage technique will have to be developed here to supersede the contact flying micrometer type. New knowledge from the Research Laboratory indicates that X-rays can be here applied and our measurements engineers are now studying the necessary new techniques which are typical of the pathway of the new knowledge from the Research Laboratory to application in practice. The aluminum foil thickness gage for measuring the thickness of aluminum foil as it speeds through the mill, in use just before the war, is again becoming prominent, only whereas previously full scale on the indicating instrument showed a difference in actual foil thickness value from a standard of 0.0004 in.; new requirements are that full scale shall show a difference of 0.0001 in. And design to do this has been completed. This is typical of after-the-war demands upon the measurement engineers for better performance than that previously available. The paper industry is now asking for continuous gaging, and work in this regard is in progress.

For measurements of thickness of small parts and dimensions, the electric gage has proved itself and has wide possibilities, and wherever a displacement can be produced for measurement, such as for measurements of force, strain, pressure, and the like, the application of the electric gage circuit gives opportunity for accuracy and precision beyond most other means.

Welding

There has always been intensive study to obtain simple means for the evaluation of a weld, though a universal instrument for such has not yet been made available. Herein is good opportunity for a new development. Careful study by the welder of all the details of the required operations and care to keep within required limits of performance gives good results. But in the study of these operations, measuring instruments play a vital part. In resistance welding where the transient current value must occur at proper time with respect to the pressure application, the current-force recorder gives a means of simultaneous measurement of current and force to allow proper adjustment of these components. The oscillograph used was developed for a war measurement project and has been called "the world's smallest" oscillograph.

For use in the resistance welding of corrosion-resistant steel, the ampere-squared second recorder provides a means for evaluating the heat (I^2tR) and serves to control the welding performance within the right limits of heating, and to open the welding power circuit if these limits are not observed by the operator. This measurement is most unique and has contributed in an outstanding manner to the effective welding of corrosion-resistant steel.

Gas Analysis

Our developments in gas analysis instruments go back to the famous letter which Dr. Willis R. Whitney of our Research Laboratory wrote to Chester Rice:

"Dear Chester:

"Could I create an interest for you in a series of fool stunts which have, I think, the promise in them of some useful outcome?

"I'd like to study experimentally (not on paper) because I expect the unexpected when we deal with such a complex subject, and this is it.

"I want to take a motor-generator set and enclose it gas-tight, replace the air with hydrogen and run the thing. When this is done, I want to see what the effect was (not before). I want to know whether it ran (1) easier (friction against gas skin friction), (2) cooler because of thermal conductivity of the hydrogen, (3) safer for the insulation because it might stand higher temperature in H_2 than in O_2 without decomposition, safer because it might arc less and electrically break down less easily because in H_2 arcing distances are greater, (4) perhaps the speed attainable economically would go up with the H_2, and speed in such things as turbine alternators and Alexanderson machines is important. This might all lead to substitution of H_2 by CO_2 or vacuum, but we could hardly carry through a series of practical tests without adding a lot to our knowledge, and we might find a real useful application. Don't worry about cost of leakage or danger; I've got that done enough already."

"Whitney"

From this letter came the research, the engineering development, and the engineering design to bring forth the hydrogen-cooled electric generator until today hydrogen cooling of turbine generators

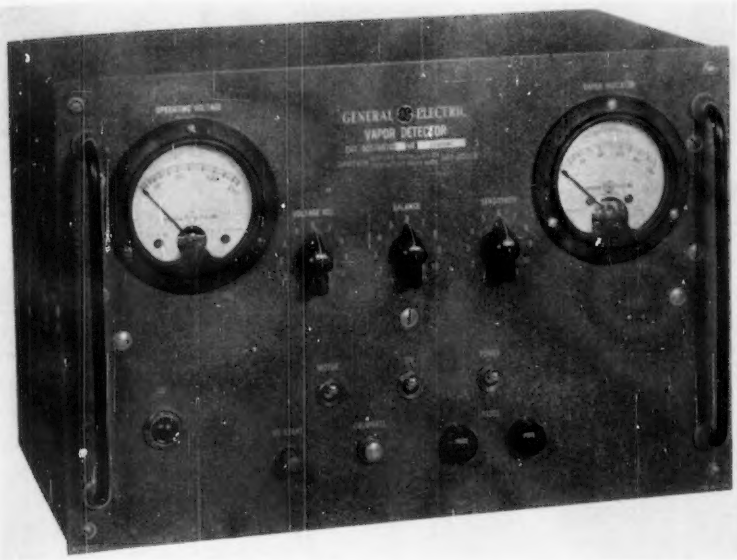

Fig. 5.—The Instantaneous Mercury Vapor Detector Resulted. Using an Ultraviolet Lamp, the Mercury Vapor Appears in the Lamp Radiation as a Black Cloud, Controlling the Ultraviolet Light from the Lamp Reaching a Phototube for Measurement Thereof.

represents a substantial proportion of the output, with the resulting benefits visualized by Dr. Whitney. This development required a hydrogen purity control, and the thermal-conductivity type of instrument and control was applied. This analyzer is useful over a wide range of gases and gas concentrations. Impurities in hydrogen, carbon dioxide sulfur dioxide, or any one of many organic vapors can be detected, provided the impurity has a different thermal conductivity from that of the gas being analyzed. The gas analysis is registered on an indicating or recording instrument which can be equipped with contacts for control. Thus, an instrument became available for permanent installation for process-gas analysis and control.

Mercury Vapor:

Other requests in this field followed. The need for knowledge of mercury-vapor concentration in working atmosphere became prominent during the war. The chemical type mercury-vapor detector resulting from new knowledge from the Research Laboratory was made available. This uses a selenium sulfide paper chimney over a lamp to create a draft. It is long-time in operation, such as 6 hr., and can detect in this time down to 1.3 parts of mercury in 100,000,000 parts of air by volume, which is the toxic limit. Use of this detector demanded a faster instrument of greater sensitivity. The instantaneous mercury-vapor detector resulted. Using an ultraviolet lamp, the mercury vapor appears in the lamp radiation as a black cloud, controlling the ultraviolet light from the lamp reaching a phototube for measurement thereof. It will measure in a few seconds concentrations of down to 0.4 part of mercury in 100,000,000 parts of air by volume. This is a much improved instrument over the lamp-shade type and gives opportunity for measurements of value in this important field. Measurements can also be made to a lesser degree of other vapors such as ozone, illuminating gas, benzene, pyridine, diethylacetal, and toluene.

Dew Point:

The measurement of the dew point also was asked attention by this group; thus an improved dew-point indicator was developed to give the moisture content of atmospheres and gases. The gas is brought to the instrument and at visual observation of the condensation on a cooled mirror, the temperature of the mirror is read to give the dew-point temperature. A demand for a dew-point recorder has been met, operating on the same principle as the dew-point indicator, except that the mirror is viewed not by human eye but by a photocell. A closed refrigerating system acts to keep the mirror cool while a heater coil surrounding the mirror causes it to rise in temperature. As the photocell sees condensation, it modulates the heater until such time as no condensation is seen. There is thus a balance to give the dew-point temperature reading within a maximum of 2 F. The present recording instrument design is for dew points of −50 F. There is need to extend this range to −100 F., and development is in progress to obtain performance in this enlarged range.

Mass Spectrometer:

Out of the war came improvements in the mass spectrometer for the measurement of isotope abundance in the high-mass range. This instrument is capable of almost complete separation of the isotopes of mercury and can be applied to all gases from hydrogen to mercury. Higher mass numbers can also be measured with the resolution decreasing as the mass number increases. The sensitivity of this instrument is such that 1 part of a gas

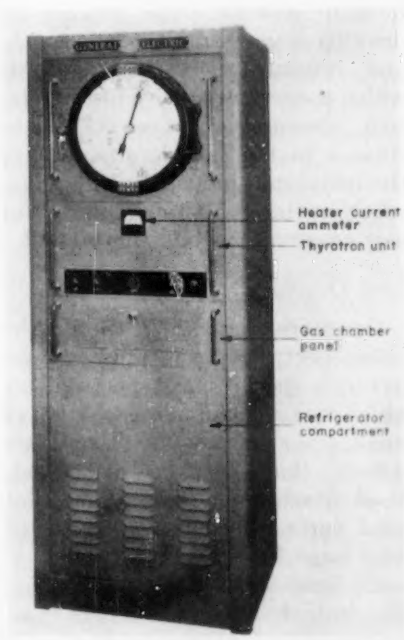

Fig. 6.—A Demand for a Dew-Point Recorder Has Been Met Through the Development of the Dew-Point Recorder, Operating on the Same Principle as the Dew-Point Indicator Except That the Mirror Is Viewed Not by Human Eye But by a Photocell.

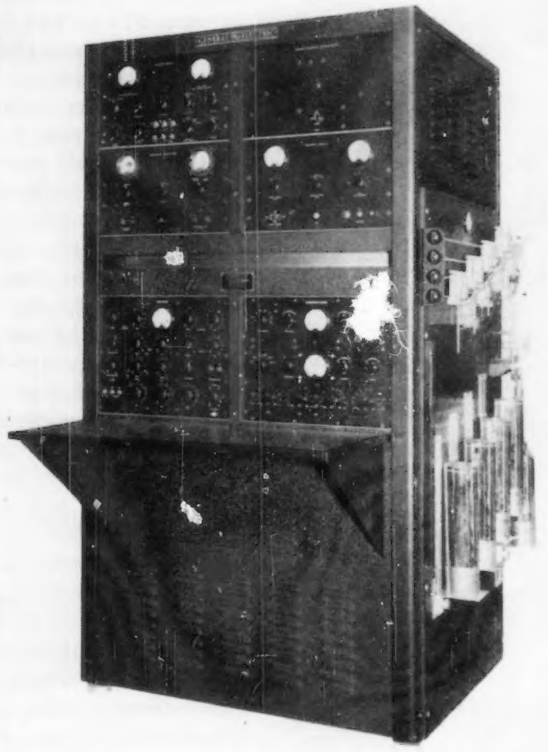

Fig. 7.—Out of the War Came Improvements in the Mass Spectrometer for the Measurement of Isotope Abundance in the High-Mass Range.

can be detected in the presence of 100,000 parts of another gas. The mass spectrometer can be applied to monitor a continuous process by drawing a gas sample continuously and printing successively records which are representative of the relative abundance of selected substances in the sample stream. In the chemical industries the mass spectrometer gives opportunities for new advances beyond the present.

Leak Detector:

One more useful application of the mass spectrometer is the leak detector, a special mass spectrometer which makes possible the location of small leaks in any metal or glass system that can be evacuated. Mass production leak testing of small parts as well as leak testing of very large high-vacuum systems is made feasible with this equipment. The leak detector will detect concentrations of helium as low as 1 part in 200,000 parts of air. Any system that can be evacuated can be tested, regardless of its working pressure. Helium can then be used as a tracer gas to show the location of leaks. It has been calculated that this leak detector will find a leak so small that it would take 16 yr. for 1 cu. cm. of leakage. Instruments such as these assure the proper testing of sealed and vacuum equipments of which the years coming will see increasing numbers in application.

Acoustic Gas Analyzer:

An acoustic gas analyzer has been developed which measures relative concentration of gas mixtures. The primary element consists of an acoustic resonator, the natural frequency of which is a function principally of molecular weight and hence gas concentration provided the gases are of different molecular weights. The analyzer is essentially independent of pressure, has an almost instantaneous response, and provides a continuous indication or record.

X-rays:

The X-ray photometer operates on the physical fact that different gases absorb X-rays to different degrees. This absorption is a function of the atomic number of the gas and the wavelength. Argon, for example, has greater X-ray absorption than nitrogen. In a mixture of argon and nitrogen, intermediate absorption would be interpreted in terms of argon concentration in nitrogen. Certain heavy metals, such as lead in gasoline, would be determined readily with high accuracy using X-ray methods.

Generally speaking, the sensitivity of the X-ray photometer is a function of increasing atomic number. Lead, for example, can be determined to a thousandth of a per cent, whereas argon in nitrogen not more than a few tenths of a per cent. Elements with low atomic numbers offer greater difficulty in analysis, and if they are in the presence of heavier elements, the solution is practically impossible. However, it is possible to determine the carbon-hydrogen ratio in pure hydrocarbons even though mass absorption coefficients of hydrogen and oxygen are not too far apart. The application of this equipment is still in its infancy. There are, undoubtedly, many problems that can be readily solved with this equipment if all the facts are known.

The field of gas analysis offers much opportunity for the use of the newly developed equipments, and

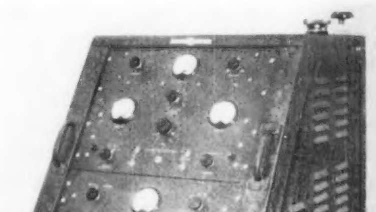

Fig. 8.—One More Useful Application of the Mass Spectrometer Is the Leak Detector, a Special Mass Spectrometer Which Makes Possible the Location of Small Leaks in Any Metal or Glass System That Can Be Evacuated.

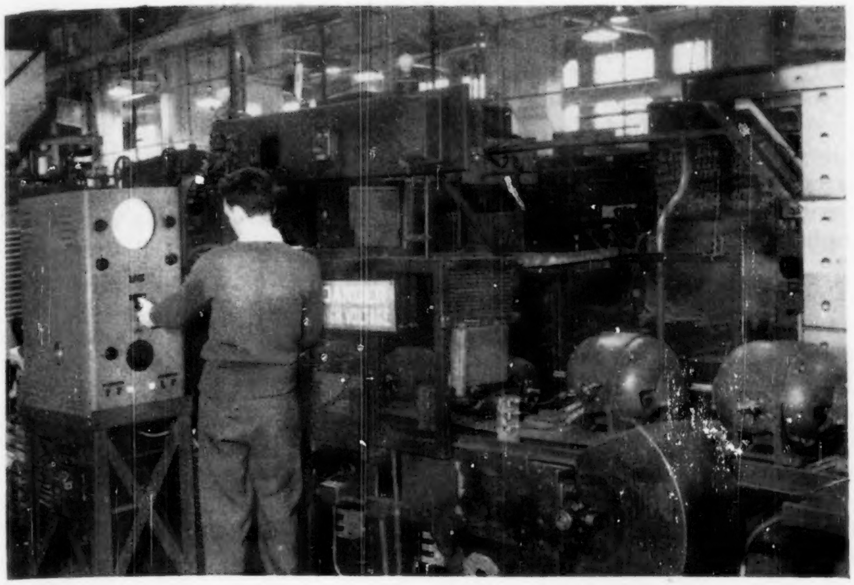

Fig. 9.—Thus the Winding Insulation Tester Was Born, and in Application to Insulated Windings Represents One of the Most Recent of Advances in Insulation Testing and One of the Most Comprehensive.

there is still much new development opportunity in this field which the years to come will unfold.

Insulation Testing

In the field of electric insulation testing there is never-ceasing activity. The insulation testing and development engineer still hopes that a testing technique may be evolved whereby the quality of insulation can be adequately determined by a simple test. Such an objective has not yet been attained. The best we can do is to test for different properties, and evaluate quality from these.

But the over-all situation is remarkable when its scope is considered. Every piece of electric equipment, irrespective of what it is, has a conductor in it, and this conductor has to be supported. And the support is an insulation. Thus the insulation is of every conceivable shape and size and of a wide variety of materials—solid, liquid, gaseous. The testing techniques to assure good quality are of wide range.

One of the most fascinating of insulation investigations was to determine the voltages due to lightning on power transmission lines, so that line and apparatus insulation would be designed to prevail against it. Surge voltage recorders and cathode-ray oscillographs and other special instruments were taken into the field on the lines to obtain the necessary data. The magnitudes of the voltages were measured in the millions of volts. The times of durations were measured in the millionths of seconds. The desired information was obtained. It was a glorious record of achievement for the insulation measurements engineer. It well typified that thoroughness with which industry has tackled the necessary problems of research, development, and design that the public may have good equipment for their service. Little credit is given to industry for these things. Yet great credit is due. And to the measurements engineer, honor for the contributions he has made.

Winding Insulation Testing:

Following our work on the high-voltage power lines, we carried on an investigation to learn how the lightning surges propagated themselves through machine windings, and as one result of this work, it was found that the propagation of the surge through the winding was a function of the quality of the insulation. So a test method was developed whereby a surge voltage was alternately impressed across one phase of a motor, then across another phase, and continuously so, and by bringing the propagated surges to a cathode-ray oscillograph screen, if insulation of both phases were good, both surges would be superimposed to show as one—whereas if there were a defect in one phase, the two surges would show a difference in form on the screen, to indicate the defect. Thus the winding insulation tester was born, and in application to insulated windings represents one of the most recent of advances in insulation testing and one of the most comprehensive. For single unit testing or for production line testing, this new instrument has been of substantial value in showing the way to insulation winding improvement.

Formex Wire:

Another recent accomplishment was the announcement of a 2000-hp. induction motor of the Tri-Clad design. Among other features, this design used Formex Wire, a new development in enamel wire insulation. Formvar insulation had been announced from the Research Laboratory as giving opportunity for a tougher wire insulation. After months of study to achieve correct application, Formex Wire was born. But to evaluate it properly there was developed a line of wire testing instruments of new design. These were the abrasion tester for measuring the durability of the film, the compression tester for determining the solidity of the film, the continuity tester for assuring that the film is uniform throughout, and the scrape abrasion tester for measuring the stick-to-itiveness of the film to the wire. This is quite an imposing array of instruments to evaluate an insulation film. And even to prove to the Patent Officials at Washington that Formex Wire marked a new advance, a new measurement had to be devised, a heat shock test in which the old product blistered while the new product remained durable and firm. So it is, that the development engineer who works with new knowledge from the research laboratory must often devise new measuring equipments and techniques to evaluate the new product that it is useful, and then may even have to prove that the product is new and represents an advance to be granted a patent. Thus, measurements play a most fundamental role.

Silicones:

I have been asked to speak on

Fig. 10.—Designed Especially for Laboratory Use, This New Bridge Will Measure Power Factor and Capacitance of Samples of Insulating Material or of Insulated Products Such as Wire, Cable, Capacitors, Motors, and Transformers.

silicones. They came about as we have always looked for higher temperature insulations. And they are providing for advance in this field, though the applications are limited to specialized equipment as yet. But in having this material available in the war production for high-temperature gaskets for searchlights and for superchargers, once again research justified itself many times over that a by-product was infinitely of more value than the product and that it was available. And in Dri-Film, an organo-silicon compound, as a water repellent on insulators, radio, and radar were vastly improved.

Now the emphasis is continued on silicone rubber with more applications appearing, in the further study of application to machine windings, for silicone oils of constant viscosity, and for cable insulation in specialized applications such as with glass for excessive temperature applications. Also as used in board laminates, a new insulation is available with characteristics advanced. Thus, though silicone is new to the electric insulation field, it has already made its contribution in these important applications and gives every promise of being more usefully applied. As materials with improved properties are developed, it will have wider and more general application.

General-Purpose Bridge:

Prominent in electric insulating testing and developing have been the bridges for measurement of power factor and capacitance. These are many, and are wide in scope and application. A new general-purpose a-c. bridge has just been made available. Self-contained and ready to operate, the bridge is a high-voltage Schering bridge with built-in standard air capacitor, electronic galvanometer, 0.030-amp., 15-kv. power supply, and an indicating crest voltmeter, all completely assembled in a single floor mounting case.

Designed especially for laboratory use, this new bridge will measure the power factor and capacitance of samples of insulating material or of insulated products such as wire, cable, capacitors, motors, and transformers. Extension to higher currents and voltages is also possible. This new bridge is one of substantial value for this important phase of electric insulating testing materials activity.

Magnetic and Metallic Testing

In the field of testing of magnetic and metallic material there is also continuous development and study. For the measurement of the usual magnetic properties there are equipments for core loss, permeability, and hysteresis. The trend is to obtain these values at higher and higher frequencies.

Magnetic Comparators:

The quest for equipments and technique for testing for defects in metallic structures still continues. Magnetic methods are available; supersonic methods are coming into prominence. The magnetic comparator provides a quick, simple, nondestructive method of inspecting ferrous parts for quality control. With this equipment, rods, bolts, springs, and small fabricated parts are compared with a preselected standard of the same size and shape to detect a difference in composition, heat treatment, or other characteristics which alter the resistivity or magnetic properties. A similar comparator for metallic nonmagnetic materials is in development.

X-rays:

The use of X-rays advanced greatly during the war, equipments to give X-ray operation at 2,000,000 v. giving great advance over the 1,000,000-v. equipments, both as to greater distance penetration and to clarity of picture. The exposure times are as follows:

Penetration, in. of steel	Exposure Time, min.	
	1,000,000 v.	2,000,000 v.
2	0.1	0.015
4	1.25	0.10
6	20.0	0.5
8	300.0	3.0
10	Opaque	20.0
12	Opaque	100.0

Betatron:

And now the Betatron gives op-

Fig. 11.—The Magnetic Comparator Provides a Quick, Simple, Nondestructive Method of Inspecting Ferrous Parts for Quality Control.

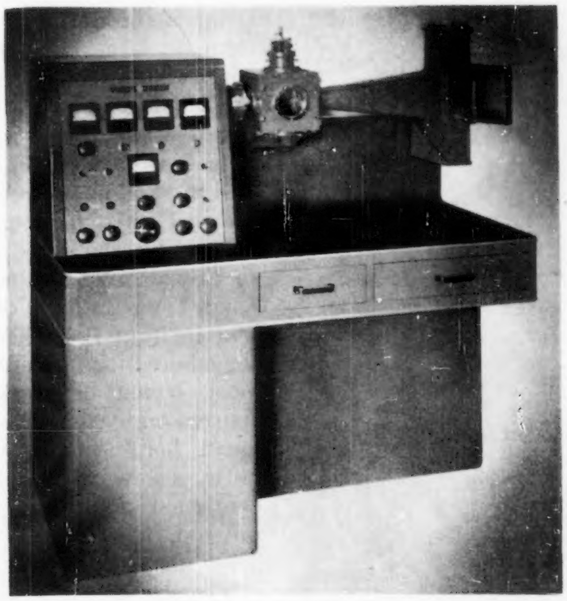

Fig. 12.—The New Electron Diffraction Instrument Is Available for Studies of Materials Having Crystalline or Repetitive Structure.

portunity for use of X-rays at 100,000,000 v. What new knowledge will come from research with this instrument, only time will tell. In nuclear power and in medicine these give much promise. And these instruments are being made available for increasing usefulness. New knowledge will be here abounding.

In the Betatron we again gain a knowledge of the high speed available when we deal with electrons, as I mentioned previously in the performance of the electronic tubes. The electrons from a hot filament are electrostatically focused and accelerated, and are then further accelerated in a hollow glass toroid about 6 ft. in diameter by means of a time-varying magnetic field. They encircle the field 250,000 times in $^1/_{240}$ sec., and each time around they get a 400-v. push, so in the $^1/_{240}$ sec. they travel about 800 miles and emerge with a potential as though they had passed between electrodes of 100,000,000 v. They then impinge upon a tungsten target to produce the X-rays, or they may be caused to leave the path earlier to give X-rays at lower potentials. Thus in these new machines, we find the wonder of the electrons, and the new knowledge which will come from them in the field of nuclear physics for nuclear power and its use we visualize as one of the newest of forces for man to use. May it be that he will ever use it for peace and never for war.

Surface Phenomena and Measurement

Surfaces are a prominent part of materials study. The new electron diffraction instrument is available for studies of materials having crystalline or repetitive structure. Its application includes work with smokes, powders, and pigments, as well as surface phenomena which cannot be studied by X-ray diffraction because of the greater penetration of X-rays.

The instrument comprises a highly stabilized 50-kv. power supply and a vacuum system including an electron gun, specimen chamber with manipulator, and a five-plate camera for photographing the diffraction effects. Comparatively large specimens of 20 to 30 lb. and up to several inches in size may be accommodated. The unit is completely self-contained in a cabinet provided with casters and requires about $1\frac{1}{2}$ kw. at 115 v.

The technique of specifying and inspecting surfaces for roughness has long been studied. There is need for a simple, low-cost instrument for indicating surface roughness. The war production brought into prominence the standard roughness specimens. These include a set of 10 metal blocks, each representing a degree of surface roughness ranging from the smoothness of a bearing surface to the roughness of a flame cut. A total of 25 surfaces is included. For standardizing surface finish these specimens have proved to be of great usefulness. Comparison measurements such as these have their

Fig. 13.—For Standardizing Surface Finish These Specimens Have Proved to Be of Great Usefulness.

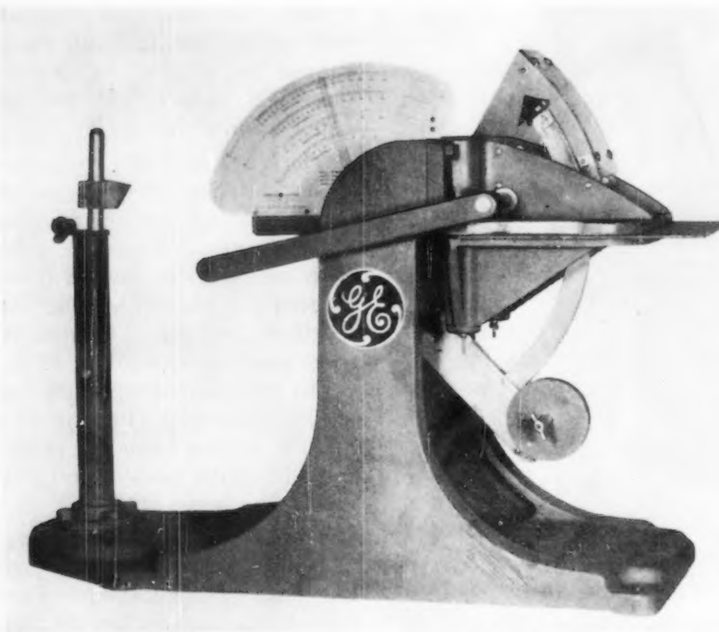

Fig. 14.—Another Instrument Coming from the War Is the Puncture Tester for Determining the Resistance to Puncture of Corrugated Board, Fiber Board, Wallboard, Vulcanized Fiber, Plywood, or Very Heavy Paper or Liner.

limitations, but when no inexpensive direct method otherwise exists, comparison methods such as this are valuable. The direct measurement is one to which attention needs to be directed.

Puncture Tester

Another instrument coming from the war is the puncture tester for determining the resistance to puncture of corrugated board, fiber board, wallboard, vulcanized fiber, plywood, or very heavy paper or liner. The instrument is of the pendulum type, and is capable of testing liner board from 0.014 in. to solid kraft fiber board 0.14 in. thick, or corrugated board from nominal nontest grade to heaviest grade of double wallboard. There being no suitable available instrument, our engineers produced this design and it was widely used in the war production. The puncture test has been adopted by the A.S.T.M. as a standard test method.

Conclusion

In closing, I should like to tell my favorite measurement story—that of Mme. Curie. It was when she was a young woman in Paris, studying for her doctor's degree. Becquerel had just announced his theory of emanations so she thought she would explore these further. So with her electrometer, that most fundamental of measuring instruments, she began her studies of materials and found emanations therefrom far larger than known knowledge would then justify. So she predicted polonium; then radium.

But though her work was adjudged to be correct, the doctors said it could not be recognized until she had isolated polonium and radium. So she went back to her shack in Paris, and with her husband, from the tons of pitchblende sent in from Bohemia by a friend, she labored for 44 months under the most trying of conditions. But spurred on by the measuring instrument, her electrometer, and with faith, perseverance, hard work, and continued application, she finally isolated a decigram of radium. Then was she acclaimed.

The site of the shack where she did her work I saw in Paris in 1939, and the concierge gave me pictures of the shack. Not a marble palace, nor a place of beauty, but a place of great faith and great sacrifice, and guided by a measuring instrument, emerging in triumph.

This I have found is the formula for much of scientific achievement, and I therefore trust that these stories will recall many similar in your own lives and will inspire others to expand their activities by the opportunities which measurements bring.

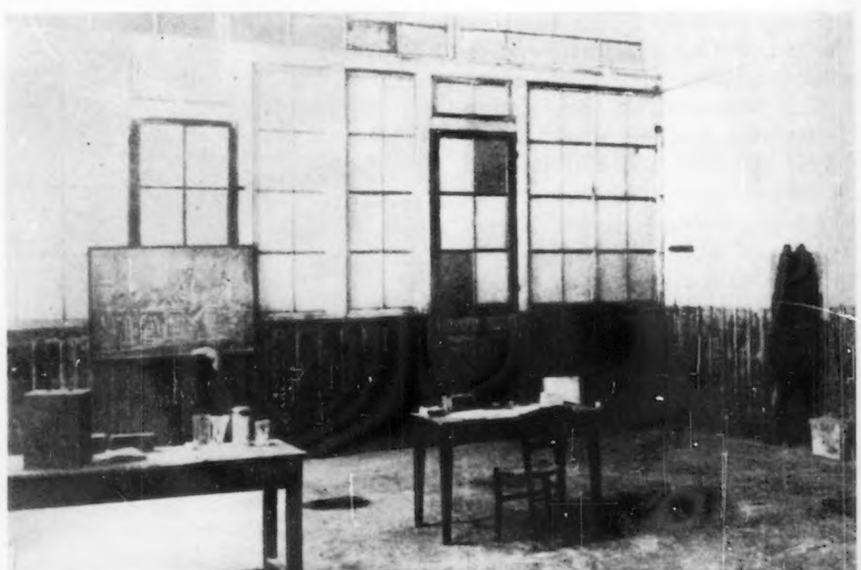

Fig. 15.—Not a Marble Palace, Nor a Place of Beauty, But a Place of Great Faith and Great Sacrifice, and Guided by a Measuring Instrument, Emerging in Triumph.

Some Problems and Trends in Building Codes

By George N. Thompson[1]

Editor's Note.—The increasing use of A.S.T.M. standards in building codes and the current emphasis on the development and modernization of building codes led the editors to request Mr. George N. Thompson, outstanding authority in this field, to discuss this subject. Mr. Thompson is also Chairman of the Building Code Correlating Committee, functioning under A.S.A. procedure. The BMS Report No. 19 on the Preparation and Review of Building Codes by him is a succinct discussion of this important subject.

THE KEY to good building code requirements is the existence of reliable standards covering quality of materials, methods of testing, and good construction practice. Without such standards, criticism of building code requirements may be expected to continue indefinitely, since there is no reference base for determining how far existing requirements depart from reasonable requirements.

Appreciation of this fact has led to continued effort in the development of sound standards. By common consent, it has been recognized that the standards of the A.S.T.M. for quality and methods of testing supply a needed element that helps to relieve doubt and confusion as to what kinds of materials come to the job. Such standards are basic. They provide the code writer with material that can be employed with assurance and help to substitute fact for opinion.

Building code standards being completed or in course of development by representative committees such as those working under the procedure of the American Standards Association supply another element that helps to introduce order and sound judgment into the building code picture. Through such committees, it is possible to provide a means by which the results of laboratory research, manufacturing problems, and field experience can all be given consideration and evaluated by qualified experts. This work is attended with many difficulties, but in the end it provides as closely as is humanly possible a consensus of qualified opinion on the matters involved.

The welding together of these standards into a coherent set of requirements calls for considerable skill, since legal principles affect the way in which engineering facts may be applied. Take, for instance, the problem of making the code continually effective in the application of the latest standards that are available. Questions of certainty and delegation of legislative authority appear. Admittedly, anyone who is expected to obey a law under penalty of fine should be in a position to ascertain just what is required of him. So in referring to a standard in a building code, it is generally thought necessary to identify it definitely by title and year of adoption by the parent society. This is admirable from the standpoint of advising the user of the code what he must do, but experience has shown that the Society often goes on to revise its standard several times before any corresponding change is made in the code reference. This is one of the causes why codes become obsolete.

Several remedies have been suggested. One is a method of statement which calls for good engineering practice in construction and then goes on to say that observance of such and such a standard—giving the name but without date—will be accepted as meeting the intent of the code. Another procedure is to identify a particular edition of the standard and then, in the administrative chapter of the code, require the building official to bring a list of all such standards in their latest editions before the City Council at stated intervals so that appropriate changes can be made to bring all such references up to date. Attention to such matters has a very definite bearing on the future usability of the code.

Another problem that arises in code making is the extent to which requirements should be based on performance rather than on specific materials, dimensions, and so on. A frequent criticism of existing codes is that they tend to be detailed specifications in terms of familiar materials and make inadequate provision for prompt acceptance of other materials that may be equally good. The preferred way of dealing with this problem is to state requirements in terms of results, frequently test results. This presupposes the existence of standard methods of testing, some of which are not yet developed. The standard fire tests of the A.S.T.M. lend themselves well to this method of approach and the work of Committee C-5 on Fire Tests of Materials and Construction has been of inestimable value. The work of Committee E-6 on Methods of Testing Building Constructions, applying to assemblies should be of great assistance in requirements applying to prefabricated structures. Here, again, are instances where standard methods of test provide a convenient tool for the code writer in dealing with problems that would be otherwise difficult if not impossible to handle.

The conventional building code of a score of years ago—and some still today—specified fire protection around structural steel columns for fireproof buildings in terms of so many inches of such and such materials. The particular thickness of a given material was probably a fairly good guess and was based on previous experience with fires and on general knowledge of the characteristics of the material. Today we can deal with this problem with much more exactness and assurance through knowledge that has developed along two different lines. Information produced from experimental fires in typical occupancies has taught us what to expect in destructive effect. Other information coming from fire tests of particular materials and constructions has provided us with a list of acceptable means of fireproofing. By matching the two

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sets of information we can evolve a rational system of requirements that furnish adequate protection and enable the designer to work out the most effective and economical solution in a given case. All this has been made possible through research and the development of scientific methods of testing.

We may visualize further benefit from development of standard methods of tests for structural assemblies. The frequent complaints that building codes tend to discriminate against novel types of construction such as prefabricated panels fail to recognize that an adequate system for determining the safety of these assemblies must be evolved in order to discharge the responsibility of protecting the public adequately. In some cases, it is true, all that is needed is to subject the proposed construction to engineering analysis and thus determine what it will do, but often this is impracticable. The only alternative then is to make appropriate tests. Lacking a standard test method, this means that the proposed construction may be subject to one series of tests in one place and a somewhat different procedure elsewhere. What is needed here is agreement on a single standard covering all necessary tests and acceptances of the results of such testing impartially whenever a construction comes up for approval.

This is still not quite the whole story, for test results may be interpreted differently unless there is agreement on what they mean. Ways must be found to reach agreement on the relation of such results to the forces to which the building is subjected under ordinary conditions of use.

Once the three factors in the problem are known—what the construction is good for under standard test, what the conditions are that it must meet in actual service, and what the relationship between these two sets of figures should be, a rational basis for code requirements is apparent and the criticism should be stilled.

The extension of this procedure leads to a more complete application of the principle already touched upon, that of wording code requirements in terms of end results rather than means of accomplishment. Carried to its logical conclusion, it would reduce many code requirements to simple statements of hours of fire resistance, carrying capacity in pounds per square inch or square foot, and so on. For purposes of information, lists of materials and construction capable of providing the required service would be given from which the designer could select whatever he thought desirable. New materials and constructions on passing the appropriate standard tests would be added to these lists.

Although there are difficulties in establishing such a system, and probably a number of cases where unavoidable departures would have to be made, there are nevertheless obvious advantages that appeal to those who would put code requirements on a scientific basis and eliminate the possibility of discrimination. The practical working out of such a procedure is dependent upon the existence of standard methods of testing covering the whole range of materials and constructions used in building. Here is a field of usefulness which should appeal to all those who are sincerely desirous of placing building code requirements once and for all upon a sound basis.

While this growing number of useful standards has simplified the problems of code writing in many respects, it has also been responsible for other problems. These include not only legal methods of referring to the standards in a way that will assure use of the latest issues but also questions as to how much of the standard it is necessary to incorporate in the code itself. It is possible to visualize a code consisting of administrative and purely local features followed by nothing but a series of references, in due legal form, to a complete set of standards covering all features customarily covered by building codes. Such a code would push to a logical conclusion the present trend toward depending on standards. It would be simple, compact and offer assurance of a sound background.

Whether we are to see this as an ultimate development depends upon satisfactory answers to several objections that immediately arise. One is that the code becomes merely a directory to a large number of documents, perhaps not conveniently available, instead of containing within itself what is required of the owner, designer, or builder. Another is that basic matters controlling safety, such as working stresses, should not be left out of the code itself but should be the direct responsibility of the municipal council.

To the first objection, the response is offered that already many standards, such as A.S.T.M. standards for quality of materials, must be consulted separately and that references to other standards merely extend a principle already established. The argument is also offered that ready availability of standards can be arranged for, and that once the user becomes accustomed to the system he finds no difficulty in adapting himself to it.

To the second, the advocates of more complete dependence on reference to standards point out that there is no well-defined line between those matters that should be covered directly in the code and those which it is permissible to leave in the reference standard. If the reference to the standard is legal, it must necessarily cover all material in the standard, including working stresses and other matters thought to be fundamental to safety.

In any event, it seems fairly clear that the growing complications of construction practice and the availability of good standards will ultimately bring about a somewhat different method of presenting code requirements than has prevailed in the past—a method whose essential features are already visible in most codes of recent vintage. Its full development awaits the completion of generally acceptable standards covering all features customarily found in building codes. Its progress has undoubtedly been stimulated by frequent criticism of existing code requirements. The major credit for its ultimate acceptance, however, will rest with many members of standardization committees who, unhonored and unsung, but with patience, fortitude, and good humor have argued their way through to a common understanding based on scientific facts and collective judgment.

Some Applications of Simulated Service Testing to Nonmetallic Materials[1]

By Alan D. Freas[2]

THE engineer is constantly faced with the question of how his material or his structure or his product will withstand service conditions. Initially, he uses the best methods of design available to him, but in many cases the complexity of the structure or some other factor may indicate the desirability of test under simulated conditions of service.

This may, perhaps, be best illustrated in the design of aircraft. All aircraft, but especially the large military aircraft, are exceedingly complex. Almost without exception, and despite advanced methods of design analysis, new aircraft models are tested under simulated service conditions before being flown or released for production.

Simulated service testing is not, however, limited to aircraft. Many simple, everyday things are so tested, either to verify the strength of a design and its suitability for the intended use, to locate sources of weakness, to evaluate the improvement in efficiency or utility imparted by a change in some detail, or to determine its durability under exposure.

This paper presents only a few examples of tests made under conditions simulating those of service. A variety of fields has been included in order to indicate the diversity of applications of simulated service testing. Many of the examples have been chosen from experience at the Forest Products Laboratory.

Housing

Housing is one of the fields in which simulated service testing is required. The structural details of such buildings have been governed for the most part by precedent, tradition, and judgment, without adequate regard for the particular requirement of a particular structure. As new forms and types of construction are developed, and as new materials or combinations of materials are employed in complex structural units or assemblies, there is an obvious need for testing. Such test data permit, among other things, the checking of design, comparison with conventional construction, and evaluation with respect to meeting minimum requirements.

It is in recognition of the need for tests of such structures that the new A.S.T.M. Committee E-6 on Methods of Testing Building Constructions was established. Subcommittees have been set up to develop methods of testing: (*a*) panels or structural units, (*b*) assemblies, (*c*) large structural members such as trusses, and (*d*) structural elements such as posts and joists.

The Forest Products Laboratory some time ago undertook tests on various elements of small framed structures. Such tests have indicated the relative superiority of certain types of construction.

A house has relatively few main parts. Of these parts, the ones that contribute most to the rigidity of the structure as a whole are the walls. Observations in numerous storm-swept areas have led to the conclusion that typical lumber-sheathed walls have adequate strength for almost any condition likely to arise as regards pressures perpendicular to them. Their resistance to end thrust, however, is more critical, both from the standpoint of wind resistance and from that of keeping the building properly

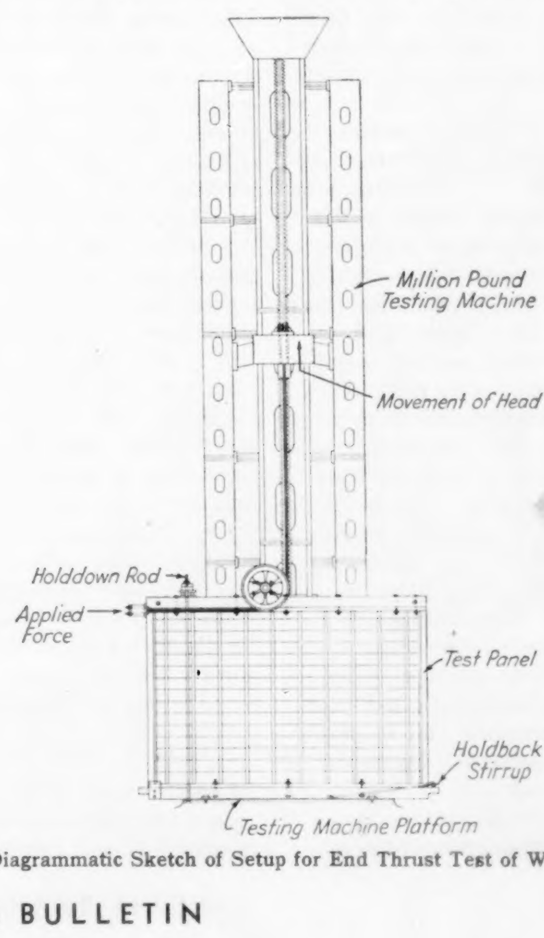

Fig. 1.—Diagrammatic Sketch of Setup for End Thrust Test of Wall Panels.

NOTE—DISCUSSION OF THIS PAPER IS INVITED, either for publication or for the attention of the author. Address all communications to A.S.T.M. Headquarters, 1916 Race St., Philadelphia 3, Pa.

[1] Talk presented at a session sponsored by the A.S.T.M. Chicago District as part of the Chicago Production Show and Conference held at the Stevens Hotel, March 22, 1946.

[2] Engineer, Forest Products Laboratory, maintained by Forest Service, U. S. Department of Agriculture, in cooperation with the University of Wisconsin, Madison, Wis.

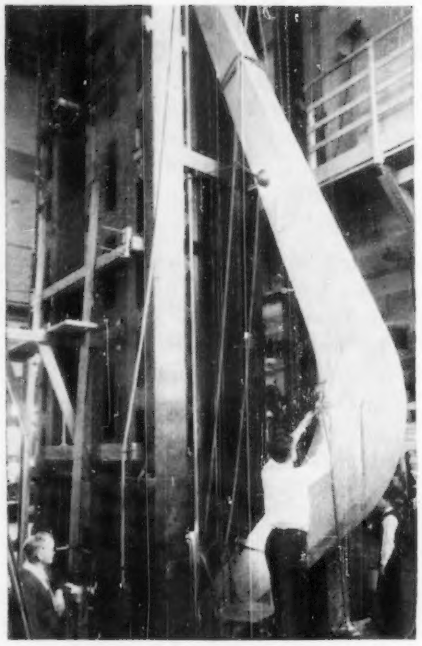

Fig. 2.—Test to Simulate the Action on Half of a Three-Hinged Laminated Wood Arch When Only the Other Half is Subjected to Direct Load.

aligned over a period of years, thereby eliminating or reducing maintenance costs. In order to determine the amount of end thrust that various types of wall construction are capable of withstanding, panels approximating in size the side of a room were tested with loads applied to the upper plate in the direction of their length.

In the test procedure developed (Fig. 1), the panel was subjected at one upper corner to a horizontal load parallel to the length of the panel and resisted by a hold-back stirrup at the opposite lower corner. This type of load simulates the racking action in a house wall resulting from a wind load on a wall normal to the one under test. The overturning tendency, normally resisted by upper-story and roof loads, was resisted, in test, by hold-down rods. The resistance to lateral buckling, normally supplied by the upper floor system, was simulated by fastening the upper plate to a heavy timber. The aligning action of cross walls was simulated by tie-rods at the ends of the panel. Cables attached to the movable head of the testing machine and passing around sheaves permitted horizontal application of load.

The superiority of certain types of frame walls was clearly indicated by the results of the tests. Especially marked was the superior rigidity of a wall having plywood sheathing glued to the framing members. Such results point the way to desirable methods of construction in areas where unusual conditions, requiring more than normal wall strength and rigidity, are met.

Similar tests on wall frames sheathed with fiberboard indicated needed improvements over the established standard of nailing and also indicated the best methods of applying fiberboard sheathing, especially around openings.

Arches

Some years ago the Forest Products Laboratory constructed on its grounds a service building whose roof was supported by three-hinged wood arches of several types, including two of laminated construction. Half arches of these two types were tested under end load, to simulate the action on a half arch when only the other half is subjected to direct load. The character of the test is indicated in Fig. 2, which shows the simulated thrust load being applied to the two ends of the half arch. Deflections were read at various positions along the length by means of the movement of a scale attached to the arch and observed through a telescope. In addition, strains over short gage lengths were read at selected positions near the knee.

A test was made also on the completed structure under simulated service conditions. Sacks of sand and gravel were placed on the roof of the structure, first on the half span and later on the full span immediately over the central arch. The load was placed in increments until the approximately uniform load across the span reached 31,500 lb., about 42 per cent in excess of the design load. Deflections of the peaks and quarter points of the five central arches were measured during the placement of the load and periodically while the load was in place over a period of more than 220 days.

Containers

Various types of tests have been devised to evaluate the resistance of containers to rough handling. Most of the tests have been developed with service conditions in mind, but do not necessarily actually simulate these conditions.

One of the most significant of these container tests is made in the drum illustrated in Fig. 3. This is a hexagonal drum which rotates and is so arranged that the container under test is shifted from side to side and end to end to subject it systematically to various hazards simulating those of transportation. Included also is a blunt point which represents the corner of another container or of a loading dock. The relative resistance to handling hazards of different types of containers can be determined by noting the number of falls needed to spill the contents or to cause excessive distortion of the container. Similarly, weak points in the container needing redesign or reinforcement can be determined, and the improvements thus made can also be evaluated.

Handling hazards are simulated also by drop tests of loaded containers from varying heights. Containers are dropped systematically on corners, edges, and faces. In addition, loaded containers are dropped cornerwise on the container under test to simulate the punching action when one container is dropped on another in handling.

The weaving action of a moving box car is simulated by a machine with an oscillating table. The container is mounted between the stops

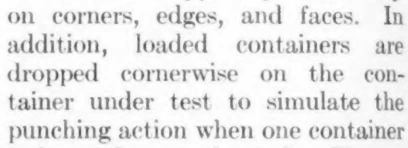

Fig. 3.—Revolving Drum for Subjecting Containers to Simulated Handling Hazards.

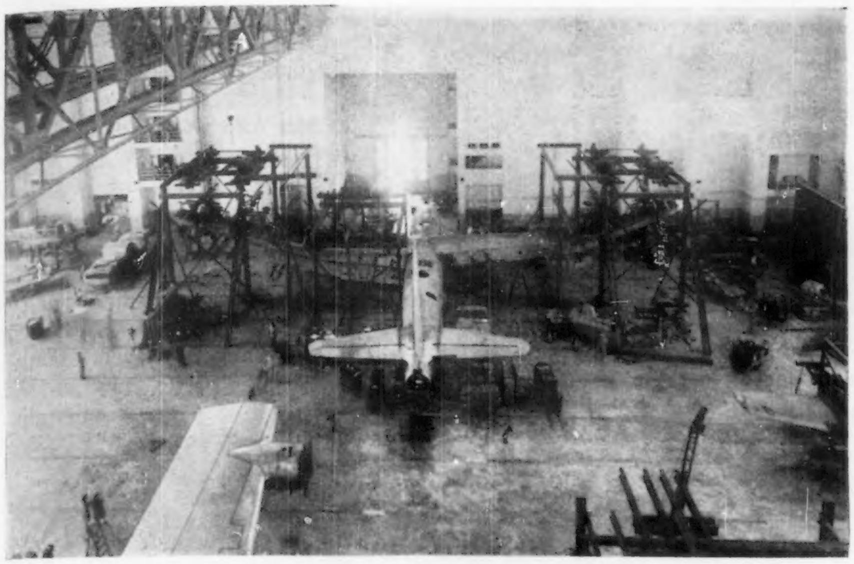

Fig. 4.—View of Main Test Area, Structures Test Building, Wright Field, Ohio.

Photograph Courtesy Army Air Force Air Matériel Command

of the table, a weight is fastened to the container to simulate the load imparted by other containers stacked on the one under test, and the table is oscillated.

The sudden starting or stopping of a box car is simulated by means of the same machine somewhat differently arranged. The weighted container is suspended in slings above the table, and the machine is operated. As the stops on the table strike the container, the action is like that of the sudden starting or stopping of a car.

Resistance to stacking loads is determined by a compression test, with the compressive load applied to the faces of the container.

Skis

Sometime ago, the Army, in preparing specifications for skis, was in need of test data to insure procurement of types or designs that would give the best of service in striking obstacles and in bridging depressions. Tests were made to evaluate various types as to their relative resistance to these failures. Several methods of test were tried, and an inclined-plane impact test was adopted. The ski was rigidly attached to a weighted carriage mounted on ball-bearing roller skate wheels. The carriage was permitted to roll down a slide, with the ski striking a heavy metal plate at the bottom of the slide. The skis were launched from increasing heights until failure occurred.

Aircraft

Simulated service testing plays an important part in aircraft design and production. As pointed out previously, almost never is an airplane design put into production without a static test of the structure.

The magnitude of the physical facilities devoted to this work at the Army Air Forces Air Matériel Command at Wright Field, Dayton, Ohio, is indicated by the size of the structures test building there. This is a relatively new building, having been in operation only about 16 months. It has a main test floor 250 ft. long and 170 ft. wide with a reinforced concrete floor 30 in. thick. Tie-down slots closely spaced over the floor area are capable of supporting a load of 10,000 lb. Two overhead cranes are available, with capacities of 75 and 150 tons and a maximum height of the highest crane hook of 102 ft. Figure 4 shows a very heavy bombardment airplane under test. This airplane, together with the men on the test floor, gives an idea of the scale of the main test area.

The various types of structures are supported by jigs consisting of fixed supports and pre-drilled steel sections which can be assembled much like a child's metal erector set to suit the particular test. Tests of many different types and sizes of structures can thus be arranged (Fig. 4).

The method of loading most commonly used in the past has been to pile shot bags on the structure under test. These bags are distributed over the structure in conformance with the expected service loads. During the loading process, the structure is supported on screw-type jacks. When the desired increment of load has been applied, the jacks are lowered according to a prearranged counted sequence. In the case of a wing, for instance, the tip sections may be permitted to deflect farther than the root sections without permitting the jacks under the root sections to clear the structure too far. This is done to insure that the jacks will prevent complete collapse of the structure in the event of failure.

The adhesive-patch method is being used more extensively than in the past. This method, developed by the Air Matériel Command's Structures Test Laboratory, consists of (*a*) tension or compression patches made up of sponge-rubber pads and plastic or metal base plates cemented together and to the surface of the structure; (*b*) a leverage system connecting the patches to hydraulic struts or jacks for applying tension or compression loads; and (*c*) a loading system composed of hydraulic struts or jacks, operated by hydraulic pressure through control valves.

The adhesive-patch method, while requiring considerably more time to set up than the shot-bag method, requires less manpower during the actual test. Its principal advantages over the shot-bag method lie in the fact that it permits more accurate simulation of actual load distribution over the surface of the structure and simulation of negative and positive pressure loadings.

In the shot-bag method of loading an aircraft wing, for example, the wings must be inverted and the load all piled on the lower surface. The actual aerodynamic loads for most airfoils are, however, distributed approximately 20 per cent on the lower surface (positive) and 80 per cent on the upper surface (negative). A combination of shot bags

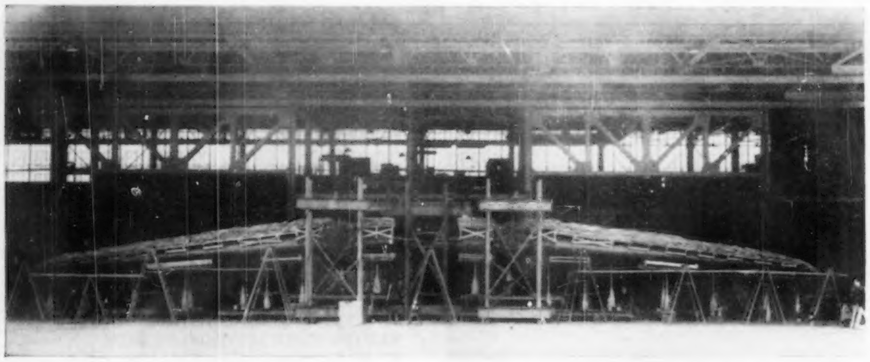

Fig. 5.—Wing of Large Plywood Cargo Airplane Under Test Using Shot-Bag Method.

Photograph Courtesy Army Air Force Air Matériel Command

and adhesive patches, or of compression and tension patches, may be used to simulate more accurately the actual pressure distribution on a wing.

Figure 5 shows the wing of a large plywood cargo airplane under test by the shot-bag method. There may be noted the character of the supporting framework, the supporting jacks, and the shot-bag load distributed over the wing.

An experimental fin for an AT-6C airplane under test for dive conditions is shown in Fig. 6. The method of reaction support may be seen, as well as the shot-bag loading, the supporting jacks, and the method of simulating the rudder reactions.

Figure 7 shows a plywood wing which had given difficulty in service with failure of leading edges. The leading edges were redesigned and the figure shows a test of the redesigned leading edge. In this method, shot bags and tension patches are used. The wing is inverted and shot bags are piled on the upper surface (lower in normal flight), to simulate positive loads, with tension patches on the lower test surface to simulate negative loads.

Flooring for Cargo Aircraft

The greatly expanded use of aircraft for transporting heavy cargo in wartime has emphasized the need for studies of flooring for transport aircraft. Considerable developmental work and testing of various materials were carried out during the war by various firms and institutions. The methods employed, however, were not coordinated to produce comparable results and to allow an interchange of information and data. Unnecessary duplication of effort resulted.

In an effort to develop and standardize methods of test and evaluation, a cooperative study was made by the Bureau of Aeronautics of the Navy Department and the Forest Products Laboratory, in cooperation with the Technical Subcommittee on Air Cargo Transport of the Joint Aircraft Committee. The examples which follow illustrate methods which resulted from this investigation.

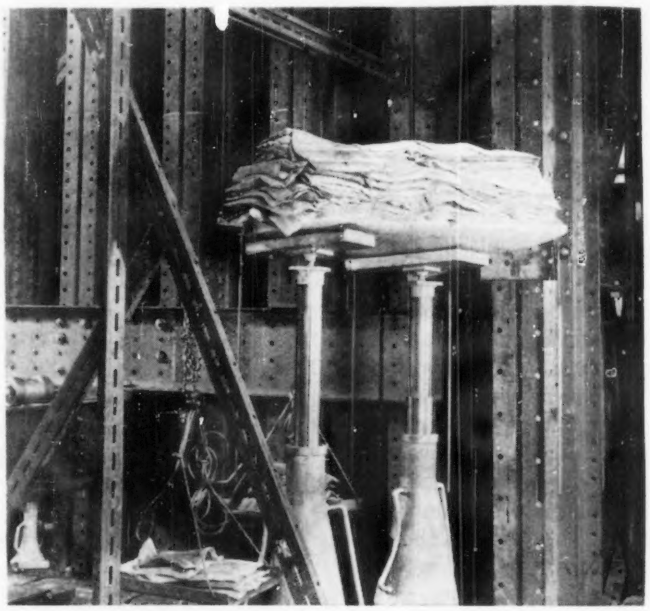

Fig. 6.—Experimental Fin for AT-6C Airplane Under Test by Shot-Bag Method.

Photograph Courtesy Air Matériel Command

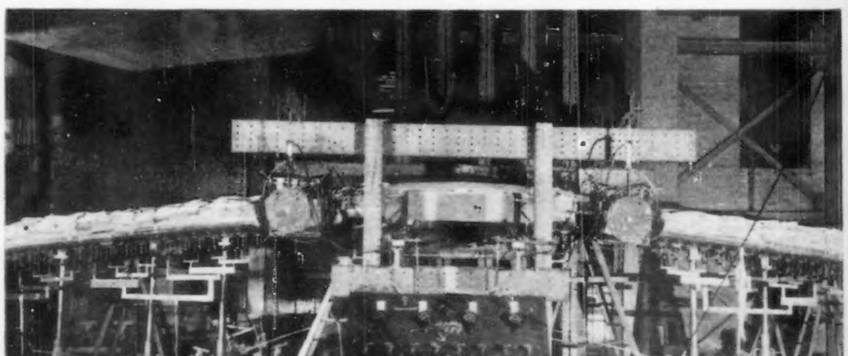

Fig. 7.—Test of Leading Edge of Plywood Wing Using Shot Bags and Tension Patches in Combination.

Photograph Courtesy Air Matériel Command

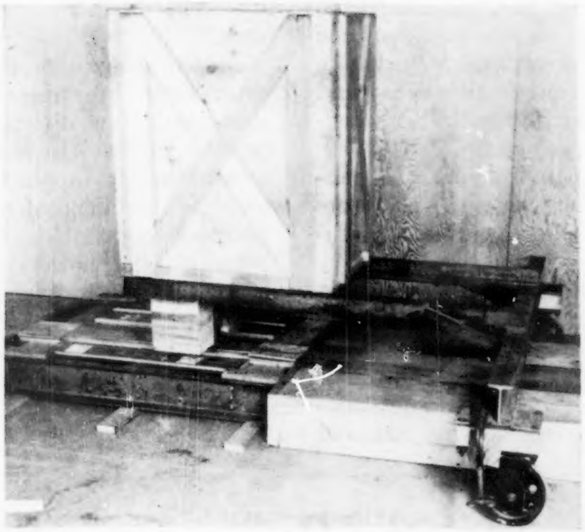

Fig. 8.—Equipment Used to Test Flooring Under Rolling Load Simulating the Effect of an Engine Cradle Wheel.

The center wheel is in place on the panel and the outside wheels travel adjacent to the panel but not on it. The wood blocks on each side of the center wheel prevent the loaded cradle from falling completely through the cargo flooring when failure takes place. The imposed load is obtained by placing the necessary weight in the wood box mounted on the cradle.

In testing the resistance of flooring to concentrated loads, the floor was mounted on a steel fixture providing edge support along two edges and a center support over which the flooring was continuous. The panels were fastened to the fixture at the edges and center, simulating the arrangement of support of the flooring on the airplane floor beams.

Concentrated loads were applied with a bar 1 in. in diameter, placed at various locations in the span, as well as with a maple block shaped to simulate the wheel of an engine cradle positioned as for travel both in the direction of the span and at right angles to it. Deflections were measured by dial gages bearing on the adjacent floor beams. In addition, the panels were loaded with an 8.25 by 20-in. heavy-duty truck tire inflated to 90 psi. The tire was placed so as to simulate spanwise movement, with the centerline of the tire at various positions with respect to the floor beams. Deflections were measured by means of a dial gage mounted below the panel and touching the under side of the flooring at the point of load.

The methods of test used for evaluating resistance to impact were developed to provide types of loading covering floor failures in transport operations. Handling of such items as wood crates and boxes and gasoline drums had been reported as contributing to many structural failures. The tests, therefore, were designed to study the effect of dropping a 200-lb. softwood box cornerwise on the flooring from various heights or similarly dropping a 365-lb. gasoline drum on its edge.

Floor panels for impact tests were mounted on fixtures as used for the tests for concentrated loads. Deflections of the panels were determined by the measured displacement of a steel pin mounted below the floor panel at midspan. Impact loads were applied by a gravity device consisting of a metal container, mounted in open side rails, so arranged that it could be supported at various heights above the floor panel. Corners sawn from soft pine or cut from the edge of a gasoline drum could be attached to the bottom of the container. The softwood tups were used for only one drop.

Rolling loads are imposed on the floors of transport aircraft by the wheels of cradles used for supporting and moving airplane engines and are a severe test of any floor. The effect of this type of load was tested by rolling a steel wheel 8 in. in diameter and $2\frac{1}{2}$ in. wide across panels of aircraft flooring. The wheel was mounted on a steel frame so constructed that two outrigger wheels could help support the frame but did not pass over the test panel. A box mounted on the frame was loaded with weights to produce the desired wheel load.

The test panel was mounted on a steel frame the same as that used for the tests of concentrated loads. The panel under test was mounted between two heavy approach panels so that the wheel could pass over the test panel at uniform speed. The cradle was pushed along one approach panel, across the test panel, and onto the second approach panel, where the motion was stopped and the direction reversed (Fig. 8).

The effect of severe abrasion contributing to final structural failure was tested by rolling a 1000-lb. general purpose bomb equipped with handling rings over a test panel. The test panels were mounted as for the engine-cradle rolling test. A wood frame (Fig. 9) was attached to the bomb casing to enable two operators to push or pull the bomb over the flooring. The bomb was moved in a straight path except on alternate trips, when an effort was made to effect a sidewise twisting motion to simulate handling and stowing.

Summary and Conclusion

This paper has not been intended to present an exhaustive survey of simulated service testing. It has rather presented only a few examples which indicate the variety of products so tested and the variety of tests which have been devised. The number of tests already employed in this field is numerous and many more are needed. Some additional tests already used include:

Fig. 9.—Equipment Used to Test the Structural and Wear Resistance of Flooring to a Rolling Load Imposed by a 1000-lb. Bomb Equipped with Rings. The bomb is moved across the floor by two men.

1. The accelerated testing of paints and other finishes under simulated conditions of bright sunlight, fog, rain, and other weather conditions.

2. The testing of paints and other finishes by outdoor exposure over extended periods and in a variety of climatic and geographical locations.

3. The testing of the durability of plywood and other glued products under outdoor exposure and under controlled laboratory conditions simulating outdoor exposure.

4. The exposure of treated and untreated posts, ties, and samples to conditions of service to determine the efficacy of various preservative treatments in preventing decay and attack by termites and other wood-destroying organisms.

5. Fire tests of doors, wall panels, and other structural elements under controlled conditions simulating those expected.

6. The exposure of instruments, structures, and materials to the conditions and organisms expected in the tropics to determine the resistance of these articles to tropical conditions and to evaluate methods and materials for increasing that resistance.

Many, perhaps most, laboratory procedures are directed toward simulation of conditions expected in service, so that the results may be most directly applied. In some cases of fundamental research, this becomes impossible. Contrary to popular belief, however, the laboratory man is not primarily interested in knowledge for the sake of knowledge alone, but in developing information that will permit the more effective and efficient utilization of his product.

An Expedient Method for the Preparation of Cantilever-Beam Fatigue Specimens

By R. D. DeWaard[1]

PLASTIC materials are continuing to be more widely used for structural and semi-structural applications and the evaluation of their fatigue characteristics is likewise growing in importance. Although fatigue tests have been devised whereby test specimens are subjected to repeated tension, compression, torsion, or combined stress of predetermined magnitude, that which is probably in most widespread use employs a cantilever-beam specimen. A specimen of this sort is used with the Krouse flat sheet fatigue machine[2] wherein the specimen is triangular in outline over its test area in order to obtain, as nearly as possible, uniform strain in any plane parallel to the centroid. The sample design is shown in Fig. 1. The specimen is loaded at the apex and supported at the base of the triangle. In order to provide for gripping and loading without introducing excessive local stresses, the specimen is flared at the loaded and supported ends. Although a specimen of this design may approach a theoretical ideal from the standpoint of stress distribution, it does not easily lend itself to any standard machining operation.

Many plastic materials, both molded and laminated, are composed of ingredients which are hard, abrasive, and difficult to machine. This fact limits the use of standard steel machining tools and makes it desirable to use tungsten carbide tools or similar very hard cutters. Although the triangular fatigue specimen could be machined with a specially designed form cutter and standard milling machine, the initial cost of this kind of tool is fairly high and its useful life is short when machining hard or abrasive materials, since several resharpenings would impair the cutter contour. Hand sawing and filing with the aid of a template has been used, but an operation of this sort is tedious and time-consuming and may be inaccurate if close tolerances are required. Another method known to have been used utilizes a vertical rotating abrasive-coated spindle, the sample being guided by a jig on a flat table to give it the specified shape. It is generally known that most plastic materials machine quite readily on an abrasive surface. The machine described and pictured in this article uses abrasive-coated cloth belts which can be easily replaced when worn.

Basically, the machine described here is a standard 4-in. bench sander[3] which has been altered to accomplish the desired results. The idle roller of the machine has been replaced with a compound intermeshing roller assembly running on oilite bearings which, in conjunction with a flat tangent plate, forms the continuous abrasive belt to the proper shape. The pertinent detail of this assembly is shown in Fig. 2. The actual diameter of the rollers will depend somewhat upon the effective thickness of the abrasive belt used. We have found the standard belt made for this machine

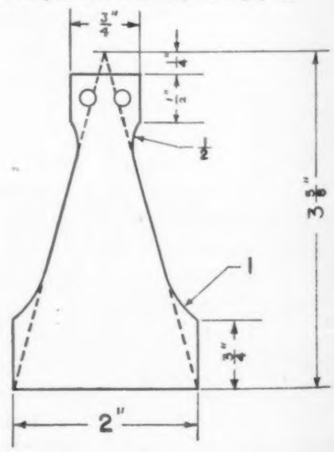

Fig. 1.—Sample Design for Krouse Cantilever-Beam Fatigue Specimen.

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[1] Stamford Research Laboratories, American Cyanamid Co., Stamford, Conn.

[2] Krouse Testing Machine Co., Columbus, Ohio.

[3] Sears, Roebuck & Co., Chicago, Ill.

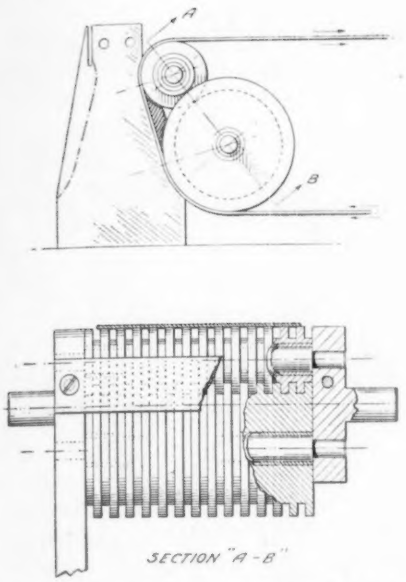

Fig. 2.—Details of the Compound Roller Assembly Used to Shape Fatigue Specimen.

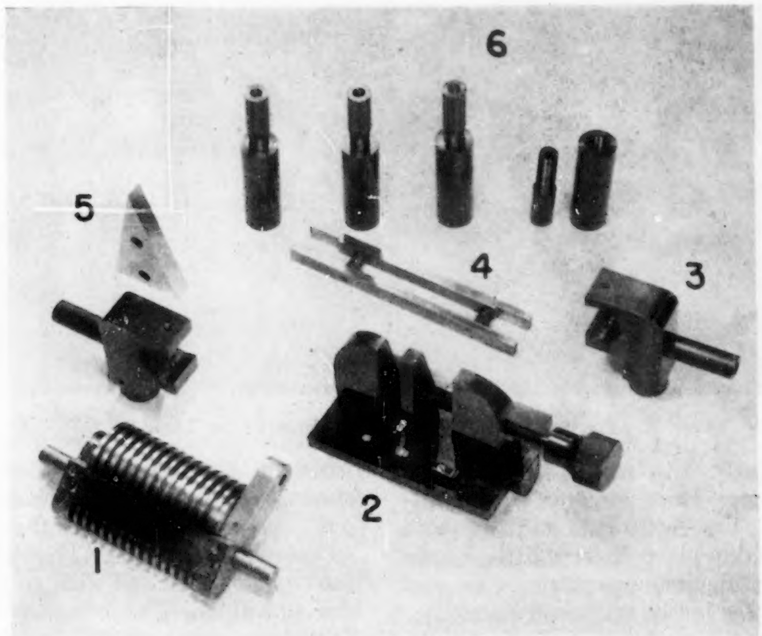

Fig. 3.—Parts Added to Commercial Sander.

1—Compound roller assembly.
2—Sample vise.
3—Supporting forks for roller assembly.
4—Aligning jig.
5—Triangle for setting cutting angle.
6—Adjustable legs for vise table.

labeled "medium garnet" quite satisfactory for most plastics.

The intermeshing of the compound roller assembly is unavoidable because of the design of the flared ends of the sample. This arises as a result of the sum of the radii of curvature being greater than the distance between the centers of the rollers. The exact dimension of the distance between the centers of the rollers to form the Krouse specimen can be computed from the specimen design (Fig. 1), but, since this calculation is tedious, the value is included here as 1.343 in. The flat tangent plate is necessary to support the belt directly under the test section. Figure 3, part 1 is a photographic view of the complete roller assembly.

The adjustable supports for the idle roller of the sanding machine are replaced with specially designed forks shown in the photograph of Fig. 3, part 3. These forks serve a dual purpose: they support the roller assembly, providing adjustment for tightening and centering the belt; and also, in conjunction with an aligning jig (part 4, Fig. 3), maintain perpendicularity between the plane of the sample and the abrasive surface. The aligning jig fastens onto cylindrical areas at the bases of the forks and functions as a guide and stop for the vise that holds the samples. The vise (part 2, Fig. 3) with its supporting table and adjustable legs (part 6, Fig. 3) complete the alterations of the sander. The table upon which the sample vise slides is a part of the standard equipment and can be set at the proper height and locked in place by means of the adjustable legs. The vise is symmetrical, allowing both edges of the sample to be machined by merely rotating it end for end and replacing it on the table. It can be guided up to the point where it makes contact with the aligning jig by means of the standard miter guide; thereafter, the aligning jig insures correct dimensions. The whole width of the abrasive belt can be used, since the sample vise can slide laterally on the table. As the standard 4-in. belt width could not be accommodated on the compound rollers, it was found advantageous to cut the belts into two 2-in. widths.

Part 5 of Fig. 3 is an accurately ground steel triangle used to set the cutting angle of the roller assembly. As would be expected, extreme care is necessary in setting this angle

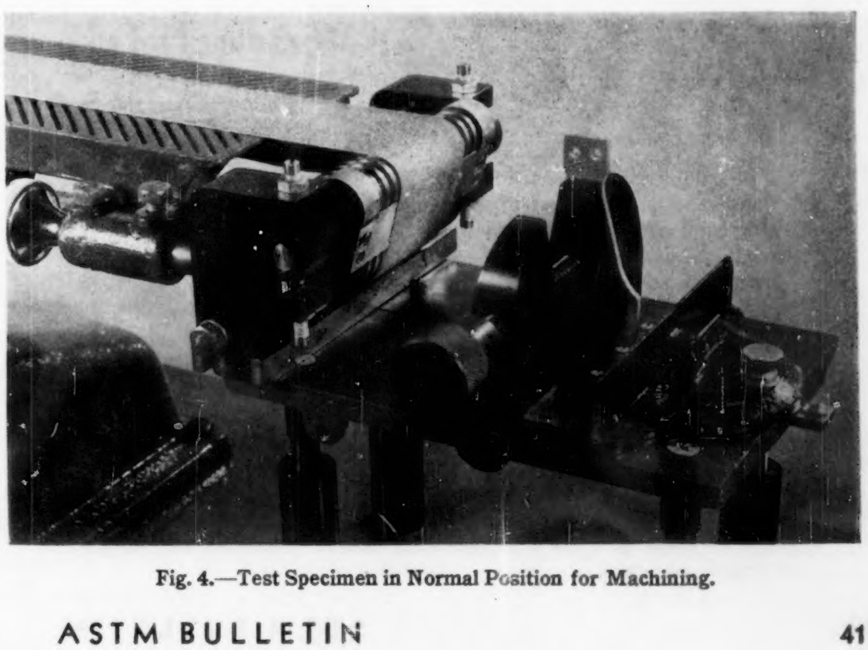

Fig. 4.—Test Specimen in Normal Position for Machining.

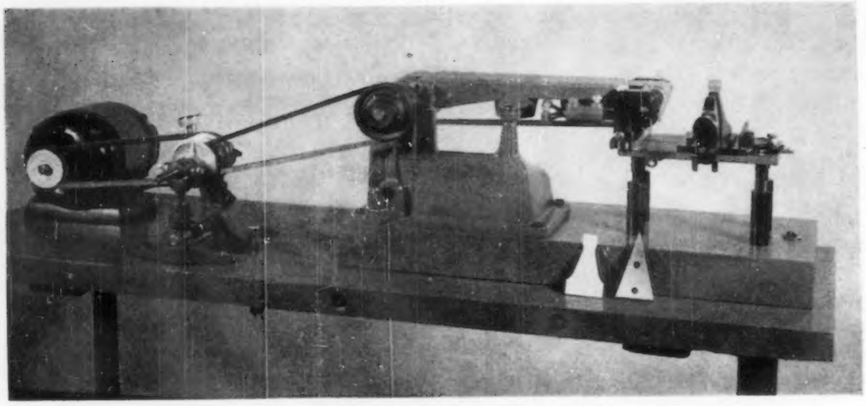

Fig. 5.—Complete Machine Mounted on Table.

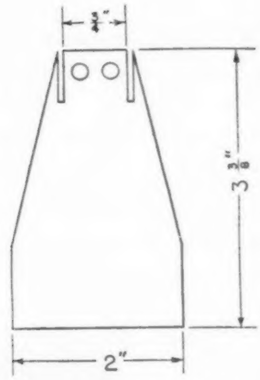

Fig. 6.—Sample Blank Prior to Finishing.

properly with respect to the table surface. However, once this adjustment has been made and the parts locked in place, there is little chance of misalignment occurring. Several samples can be machined simultaneously, the number depending upon the individual sample thicknesses. Figure 4 shows a close-up of the essential machining and sample supporting parts with a sample in the normal position for machining. Figure 5 shows the complete assembly mounted on a rigid table. The sander base and sample table are mounted on a heavy channel iron for rigidity. A multi-speed jack shaft is inserted between the sander and the motor to afford variable belt speed.

Some preliminary preparation is necessary before samples can be finished on this machine. Figure 6 shows the results of the "blanking out" operation which fixes the overall sample dimensions. The slots at the top can be sawed with an abrasive cut-off wheel, and the two holes drilled in their proper places with respect to the base of the sample. (This operation would be necessary regardless of the method of preparation.) When the samples have been prepared as shown in Fig. 6, they can be finished on the sander.

Conclusions

Although not all types of plastic materials have been machined by this method, it is fairly certain that, by using the proper abrasive surface and machining speed, most can be handled with satisfactory results. Thermoset moldings and laminates machine readily by this method. Dry sanding of thermoplastics, although not attempted, probably could be effected with low linear belt speed. Some metal samples have been prepared on this machine. Duralumin, especially, can be handled very satisfactorily. A point worth considering in regard to the finished sample is that the marks left by machining are all lengthwise along the edge of the sample and therefore introduce practically no stress concentrations since they are directed parallel to the principal stresses in the sample. The time required to prepare the samples, to within close tolerances, is remarkably short. Specimens can be satisfactorily prepared by anyone exercising a degree of caution.

Impact Testing of Adhesives*

By Arthur H. Falk[1]

Synopsis

With the organization of the Society's Committee D-14 on Adhesives, the evaluation of this important group of materials will gradually shift from the present confusion of the trial-and-error system to an orderly process of engineering appraisal by nationally recognized standard test methods.

The use of adhesives for structural and structural-electrical applications has increased enormously during the war period. The extent to which such utilization can be projected into the postwar period, with the inevitable tightening of consumer requirements, will depend to a great extent on our engineering knowledge of these materials.

The test method described herein was developed with a view to obtaining a more precise picture of impact strength than can be obtained by the traditional hitting with a hammer, or dropping on the floor. Based on the general principle of the falling ball test for plastics, it comprises a relatively simple device for determining single-blow strength and impact fatigue.

Data are given for a few adhesives when used in connection with metals and organic materials.

One of the principal objections raised in connection with the Izod or excess swing (pendulum) machine for measuring the impact strength of brittle organic materials of relatively high density is that the energy necessary to carry away the broken-off half of the specimen is a substantial proportion of the total energy indicated. Further, the construction

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* Presented at a meeting of Subcommittee I on Strength Tests, of A.S.T.M Committee D-14 on Adhesives, October, 1945.

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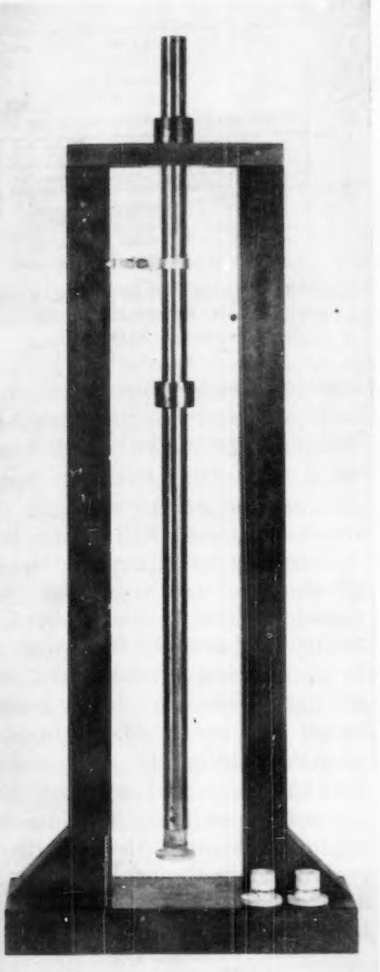

Fig. 1.—Impact Testing Machine.

of the Izod or excess swing (pendulum) machine is such that a sizable amount of the total work done must be attributed to the elastic work done on the relatively long and slender pendulum and associated parts. This has been discussed at some length (**1**)[2] and needs no repeating here. In 1940, a simple falling-ball device was built at these Laboratories (**2**) to supplement the pendulum machine for those cases where the latter is inadequate. Other investigators have subsequently elaborated the method (**3**, **4**).

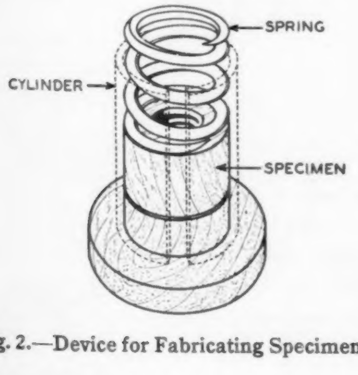

Fig. 2.—Device for Fabricating Specimens.

The situation is similar but much more intensified in testing adhesives, for here we have an almost invisible glue line holding together two parts of relatively enormous sizes and weights. It is highly essential that the test method measure as nearly as possible only the strength of the glue line and rigorously avoid any measurement of energy necessary to carry away several ounces or pounds of steel, aluminum, wood, etc.

Description of Testing Device

Falling ball devices, while emiently satisfactory for testing homogeneous plastic materials, do not lend themselves so well to the test-

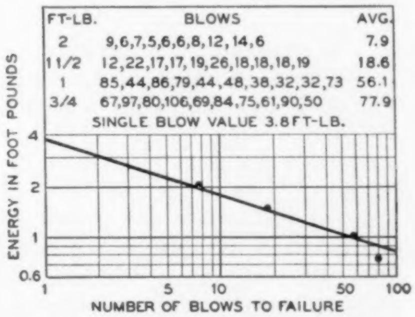

Fig. 3.—Buna N Rubber-Base Adhesive with Hot-Set Steel Specimens.

ing of composite materials, such as bonded or glued materials. There is no known method of determining whether the entire area within the glue line is bonded without destroying the bond. Consequently, it is necessary to provide a greater area of bonding surface than would be necessary in the event that a perfect bond over the entire area could be assured. This factor has necessitated the use of much larger specimens than would be required in the testing of homogeneous plastic materials. The use of larger specimens in turn has resulted in considerable revision in the falling ball test to adapt it for the testing of bonded materials. In selecting the sample to be used in these tests, it was decided to use as the lower half of the specimen, the same specimen as is being proposed in the tentative method of test for tensile strength of metal-to-metal bonds, namely,

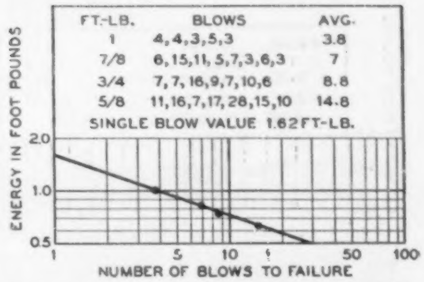

Fig. 4.—Buna N Rubber-Base Adhesive with Cold-Set Steel Specimens Aged 96 hr.

a flange-shaped steel specimen, the smaller section of which is 1.129 in. in diameter and $\frac{3}{8}$ in. high, and the flange section $1\frac{3}{4}$ in. in diameter and $\frac{1}{4}$ in. high. The part bonded to this detail is a steel cylinder 1.129 in. in diameter provided with a $\frac{1}{2}$ in. by 13 thread hole at one end. Through the use of such a specimen it is possible to fasten the specimen to the end of a long rod vertically mounted. To provide the required impact, annular weights so designed as to slide freely down the rod were constructed. These weights were so manipulated that the glue "squeeze out" could not influence the results obtained. The energy level of the blow is governed both by the weight of the ring and the height of the fall. This design was selected since it exposed a relatively large area, the 1.75-in. diameter flange of the specimen, to the force of the blow. This large striking area is particularly desirable to avoid eccentric loading, which would result in a tearing action rather than a true tension impact obtained when the force of the blow is concentric with and at right angles to the glue line.

In operating this device, shown in Fig. 1 along with several specimens, the threaded hole in the upper portion of the bonded specimen is tightly screwed cnto the $\frac{1}{2}$-in

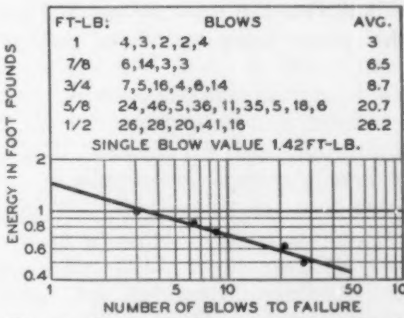

Fig. 5.—Buna N Rubber-Base Adhesive with Cold-Set Phenol Fabric Specimens Aged 96 hr.

[2] The boldface numbers in parentheses refer to the references appended to this paper.

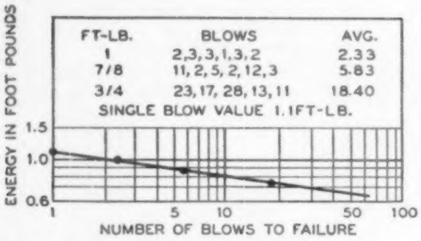

Fig. 6.—Resorcinol Formaldehyde Adhesive with Cold-Set Phenol Fabric Specimens Aged 140 hr. at Room Temperature.

threaded fitting at the end of the vertical rod. Annular weights of suitable size are then repeatedly dropped on the specimen from a predetermined height until failure takes place in tension perpendicular to the glue line. The manipulation of this test is entirely manual.

Preparation of Specimens

In common with the falling ball test for plastics, this device requires the testing of a sizable number of specimens in order to obtain an integrated picture of the impact strength. Further complicating the picture is the fact that in the present stage of the art of bonding, there is no way of ascertaining or guaranteeing, prior to destruction, that the component parts of the specimen are bonded over 100 per cent of the area. It has been the author's experience that even though the manufacturer's directions be carefully followed, 100 per cent bonding is not general. Consequently, the number of specimens must be increased to obtain a comprehensive picture of the bonding material.

Considerable thought has been given to devices for maintaining proper temperature and pressure condition during bonding. One method used in fabricating the specimens is shown in Fig. 2. In this device the pressure exerted by the press compresses the helical spring into the cylinder until the top of the spring is flush with the cylinder top. The spring is so designed that when compressed to the top of the cylinder the required pressure is exerted on the specimen. However, any suitable means for controlling the pressure and temperature will go a long way toward improving the quality of the bond.

The major portion of the data presented in this paper is devoted to a comprehensive study of a commercial synthetic rubber-base adhesive intended for all types of bonding, particularly metal to metal. In preparing these specimens, each half (following chemical cleaning) was first coated with the adhesive, permitted to dry for 24 hr., according to the manufacturer's instructions, and then the specimens were bonded together using the device previously mentioned for controlling the recommended pressure at the recommended temperature. A sufficient number of specimens was made to obtain data on several different energy levels. In Fig. 3 are shown the data plotted on log-log paper. As in the case of a falling ball test, when the points are connected in the form of a straight line, the point at which this line crosses the vertical axis is designated as the single-blow strength. While it is recognized that this extrapolation may not be exact, it appears to indicate more accurately than any other proposed method the single-blow impact value. It would be possible, if desired, to obtain an endurance limit on these specimens under the conditions of the test. This endurance test was not carried out in this case due to the pressure of other work.

In Figs. 4 and 5, skeletonized data are given on the same adhesive cold set with both steel and fabric-base phenolic laminates, respectively. Similar curves are shown in Figs. 6 and 7 for the fabric-base phenolic laminates when bonded with cold setting resorcinol formaldehyde and casein cements. The data obtained with these latter cold-setting cements under the conditions used are very spotty, undoubtedly due to the inherent difficulty in the use of these materials in obtaining successful high-strength joints consistently between metal to metal, and fabric-base phenolic laminates. It is realized that the casein and resorcinol resins are not primarily intended for such applications and the results reported herein should in no way reflect on the general excellence of these cements.

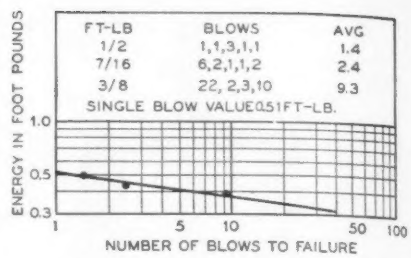

Fig. 7.—Casein Glue with Cold-Set Phenol Fabric Specimens Following 1-week Aging.

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Lubricants for Synchronous Unit Bearings[1]

By Jonathan L. Snead[2] and Henry Gisser[2]

SYNOPSIS

Representative available lubricants were subjected to a series of tests in synchronous units, involving storage followed by angular error measurements, in order to determine the best type of lubricant and the factors involved in achieving satisfactory lubrication.

It was indicated in these tests that a mineral oil having additives for optimum oxidation stability and rust preventive properties was the best of the products studied, although there is need for considerable improvement. It was also indicated that some degree of corrosion protection is required in active service or storage and that fatty oils yielding gummy products on oxidation are to be avoided. Tests on a specially prepared grease indicated that grease lubrication may be feasible, but further work is needed.

REMOTE control systems of industrial and military equipment make extensive use of synchronous units[3] equipped with ball bearings (**1**).[4] These units are generally used in pairs consisting of a transmitter and a repeater. In principle, the rotors of the transmitter and repeater are always synchronized so that displacement of the transmitter rotor by mechanical means causes corresponding displacement of the repeater rotor. In practice, the repeater rotor is always displaced from the synchronous position by an angle, however small, which constitutes the angular error of the system. The torque on the repeater rotor causing it to return to synchronous position is a function of the angular displacement from that position. The angular error is due both to electrical and mechanical errors. The former, being fixed during manufacture of the unit, is always made sufficiently small so that the total angular error of the unit is within specification requirements. The latter is a function of bearing friction and may increase with time due to bearing corrosion or other causes. When the angular displacement of the repeater rotor is such that the resultant torque is below that required to turn the bearings, there is no further displacement toward the synchronous position and the displacement at this instant is the angular error. The problem of synchronous-unit lubrication therefore consists of using a lubricant that will result in bearing friction sufficiently low so that the angular accuracy requirement of this unit will be met, and that will maintain the required low bearing friction during a sufficiently long period of time.

In many applications, synchronous units rotate at very low speeds, are in use for only a fraction of the time, and are required to have a high degree of accuracy. The latter requirement frequently precludes the use of the common grades of grease (**2**) since the torque at small angles from synchronous position would be insufficient to rotate grease-lubricated bearings. In some types of equipment (particularly military equipment) it is not feasible to provide for routine relubrication of the bearings because of complexity of the equipment. This results in a difficult lubrication problem, since the bearings are initially lubricated with several drops of oil, and any relubrication requires excessive expenditure of time and labor of expert personnel. Experience had demonstrated that when lubrication failure is encountered, it is frequently necessary to install new bearings. This requires disassembly of the unit.

In order to maintain the accuracy requirement over a long period of time, it is necessary that the bearings be lubricated with a lubricant that will have desirable viscosity characteristics throughout the temperature range of operation and that will not change with time in such a manner that the accuracy of the unit will be impaired. In addition, the lubricant must protect the metal surface of the bearing from corrosion. The lubricant must therefore have the following specific properties:

(*a*) High viscosity index,
(*b*) Stability to oxidation,
(*c*) Rust prevention,
(*d*) Adherence to metal,
(*e*) Low volatility, and
(*f*) The lubricant must not react with any materials which may be present in the atmosphere surrounding the bearing with the formation of solid or gummy substances.

The last is specifically mentioned because the insulating varnish of the synchronous unit may emit volatile materials which may precipitate in the oil in the bearing. With respect to temperature range, it must be taken into account that units may operate as much as 50 F. above ambient temperature, and that the latter may be unusually high because of proximity of the unit to other parts of the equipment which may be generating heat. The need for an "oiliness" requirement has never been established.

Selection of oils for this application was previously based on laboratory data involving the customary measurements (such as pour point, oxidation stability, copper-strip corrosion, and laboratory anti-rust tests) and on previous experience with particular lubricants. The latter has not been sufficiently extensive to permit any correlation between specific properties of the lubricants and serviceability in precision instruments or bearings. One of the lubricants used to a great extent in the past for this application was a mixture of a mineral and a fish oil. While this oil was subject to thickening by oxidation, its adherence to the metal surfaces was good and its over-all performance was superior to that of a straight mineral oil.

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[1] Published with the permission of the Chief of Ordnance, Army Service Forces.

[2] Chemists, Frankford Arsenal, Philadelphia, Pa.

[3] "Selsyn" and "Autosyn" motors are typical examples of synchronous units.

[4] The boldface numbers in parentheses refer to the list of references appended to this paper.

TABLE I.—PROPERTIES OF LUBRICANTS.

Lubricant	Adherence to Metal	Oxidation Stability	Rust Prevention	Viscosity at 100 F., centistokes	Viscosity at 210 F., centistokes	Flash Point, deg. Fahr.	Pour Point, deg. Fahr.
A.......	Poor	Fair	Good	37.1	7.38	310	Below −65
B.......	Poor	Poor	Good	20.0	3.58	345	−65
C.......	Good	Fair	Fair–Poor	27.6	4.60	425	−45
D.......	Poor	Good	Poor	17.4	4.11	325	Below −65
E.......	Good	Poor	Good	20.9	5.59	520	+40
F.......	Good	Fair	Good	9.93[a]	2.52[a]	310[a]	Below −65[a]

[a] These figures represent properties of the base oil used to prepare lubricant F.

During a general research program on lubricants for fire-control instruments, it was found necessary to undertake a study of the properties of lubricants in synchronous-unit bearings, and to determine the effect of these properties on the torque required to turn the bearings with increasing time. Studies of this general type, including development of test equipment, were made before, particularly with respect to motor and wheel bearing greases (3, 4). In such studies it was customary to determine the time required for a certain amount of wear to take place on a bearing surface, or the extent to which the bearing heated up under various conditions, etc. The problem involved here is fundamentally different, however, in that we are dealing with extremely low torques. There is little interest in the time required to wear the bearing to a certain extent, because the bearing has become useless for the intended application long before the extent of wear becomes noticeable by "macroscopic" measurement. At the time this work was undertaken, there were no methods available to study the small changes in torque encountered with synchronous-unit bearings and the accuracy of the motor was therefore taken as a measure of the serviceability of the lubricant. The effect of other factors was reduced by using the same units throughout the work. Although this work was intended primarily for military instruments the results are of interest in connection with general lubrication problems of precision bearings and instruments.

This paper describes the results of approximately one year's tests at 160 F.

Experimental Procedure and Results

The following lubricants were used in this work:

Lubricant A. A refined mineral oil containing an oxidation inhibitor and a rust inhibitor.

Lubricant B. A refined mineral oil containing a rust inhibitor.

Lubricant C. A synthetic lubricating oil.

Lubricant D. A refined mineral oil containing no additives.

Lubricant E. A fish oil.

Lubricant F. A specially prepared grease consisting of one part of a highly stable low-temperature instrument grease (containing an oxidation inhibitor) and one part of a refined mineral oil containing no additives.

The properties of these lubricants are summarized in Table I.

The ball bearings used were New Departure type E 15, with steel retainers, selected and processed for use in synchronous units. The synchronous units were types II-4 repeaters (Frankford Arsenal Tentative Specification FXS-348). One type I-2 transmitter was used to drive the repeaters. When the repeaters were not in use, they were assembled with spare bearings and stored in friction-top cans containing silica gel.

The bearings were stored in an evacuated desiccator over calcium chloride and sodium hydroxide before use. When ready for use, they were washed twice with mineral spirits and once with petroleum ether and immediately placed in a hot air oven at 140 ± 2 F. After 10 min. they were lubricated with 2 drops (approximately 0.10 g.) of oil or 0.10 g. of grease and the units immediately assembled. The bearings were selected so that the initial angular error of the assembled repeater with the test bearings was less than 0.80 deg. Only the outer races of the bearings were touched with the fingers during cleaning, lubrication, and assembly, and this handling was reduced to a minimum. This work was done in an atmosphere relatively free from dust, in spite of which, approximately 40 per cent of the bearings were rejected during initial lubrication and assembly. Four sets of two bearings each were lubricated with each of the test lubricants. One repeater was used to test two sets of bearings, and bearings were always tested with the same repeater.

The assembled units were subjected to angular error tests. The bearings were then removed and

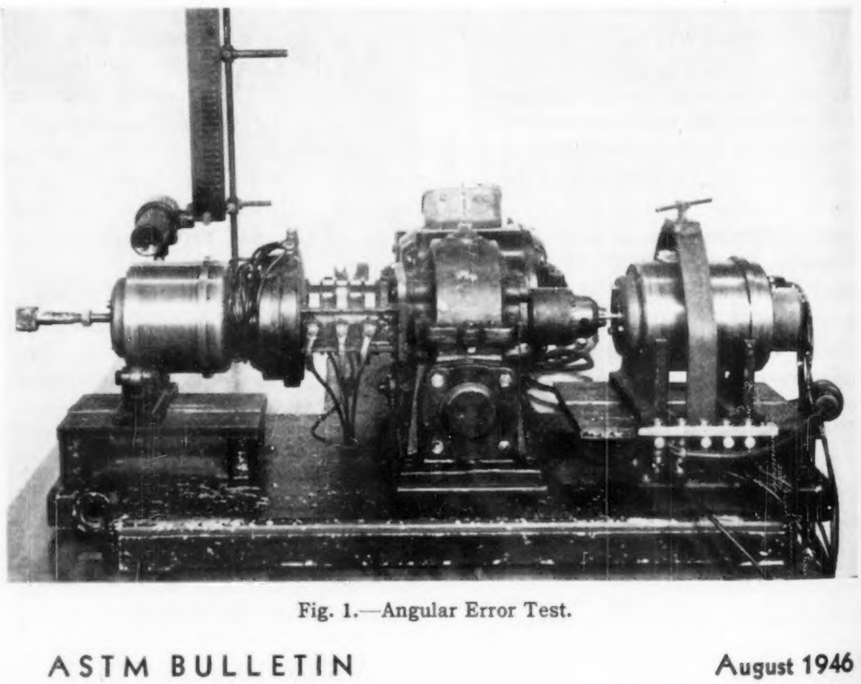


Fig. 1.—Angular Error Test.

TABLE II.—STORAGE DATA.

Lubricant	Weeks for Failure (mean)	Standard Deviation	Sample Size
A......	33.7	9.24	3[a]
B......	23.0	12.57	4
C......	22.5	6.03	4
D......	9.8	5.50	4
E......	11.5	8.10	4
F......	25.5	6.40	4

[a] One set of bearings was accidentally contaminated with dirt and the data on this set were therefore discarded.

TABLE III.—LEVELS OF SIGNIFICANCE OF OBSERVED DIFFERENCES AMONG LUBRICANTS IN PER CENT.[a]

Lubricant	B	C	D	E	F
A.........	> 20	15	5	5	> 20
B.........	...	> 20	15	20	> 20
C.........	...	...	5	10	> 20
D.........	...	...	..	> 20	5
E.........	...	...	..	...	5

[a] Levels of significance are given at 5 per cent intervals. The actual probability is between the given figure and the next lower one.

placed in an oven at 160 ± 1 F., the plane of the bearings being vertical. At intervals of one week the bearings were removed from the oven, assembled into repeaters, and the latter subjected to angular error determinations. The bearings were then removed from the units and replaced in the oven. This was continued until the mean angular error of a repeater with a particular set of bearings was greater than 1.0 deg. for three consecutive weeks. This criterion for unserviceability is somewhat arbitrary, and reasons for its choice will become apparent when errors in the angular error determination are discussed later in this report.

Angular error determinations were made in the following manner: The repeater and transmitter were mounted on the test fixture (Fig. 1). A mirror was mounted on the end of the repeater shaft, and an optical lever was used to measure the angular rotation of the repeater shaft. The scale was mounted at a distance of 1 m. from the mirror. The synchronous units were rotated at 1 rpm., one revolution clockwise, one revolution counterclockwise, a second revolution clockwise, and a final revolution counterclockwise. The angular errors were calculated from the total displacement of the light ray during the first two and last two revolutions and the results averaged. The following formula was used to calculate the angular error:

$$E = 0.287d$$

where E is the angular error in degrees, and d is the displacement of light ray in centimeters. (The above formula is valid because the ray of light reflected from the mirror was maintained approximately perpendicular to the scale, and the angles measured were of the order of 1 deg.)

When a set of bearings had become unserviceable, the bearings were observed under a magnification of 30 to obtain visual evidence of cause of failure.

Volatility determinations were conducted at 160 F. for 96 hr. using a sample of 2.0 ml. in a Norma-Hoffmann grease test dish (approximately 2.5 cm. in diameter) in a gravity convection oven.

The results of angular error determinations on stored bearings are given in Table II. Differences between each of the observed means in Table II were compared with a function of the standard deviations to determine whether the differences observed could be attributed to experimental errors (5). The probability of a difference due solely to experimental error being as large as each of the observed differences is given in Table III. The probabilities are given in 5 per cent intervals, actual probabilities being between the value given and the value 5 per cent lower.

The volatility data are given in Table IV. Previous experience in this laboratory had demonstrated that, with the method used, the volatility levels off after 96 hr. following which it is reasonable to make comparison. For convenience in reference, the order of suitability of the lubricants tested is given in Table V, together with the order of volatility.

The observations on the bearings after failure are summarized in Table VI. Gummy deposits on a bearing lubricated with lubricant E are illustrated in Fig. 2, while Fig. 3 illustrates a typical rusted retainer. Difficulty was encountered in photographing the balls and races because of their high polish.

From consideration of the known properties of the oils it was to be expected that lubricant A would show the best behavior, since it represents an optimum of desirable properties, whereas lubricant E would be poorest because of its extremely low stability to oxidation. In this connection it should be noted that although mineral oils drain easily from metal surfaces, any rust-preventive additives present may be preferentially adsorbed on the metal, leaving a film having a much higher rust-inhibitor concentration than the original oil. For this reason, rust preventive oil may be effective after considerable drainage. This probably explains the behavior of lubricant B, which was somewhat poorer than lubricant A, although not significantly so.

The behavior of lubricants B and D permits valuable conclusions to be drawn. Both of these are petroleum oils, the essential difference being that B has an added rust preventive, and the superiority of B may reasonably be attributed to the presence of the rust-preventive additive. This is of particular interest since the storage was conducted under conditions which were not particularly corrosive. On the

TABLE IV.—VOLATILITY.

Lubricant	Volatility after 96 hr. at 160 F., per cent
A.............	12.13
B.............	9.68
C.............	0.41
D.............	10.17
E.............	2.74[a]
F.............	14.68

[a] Increased in weight.

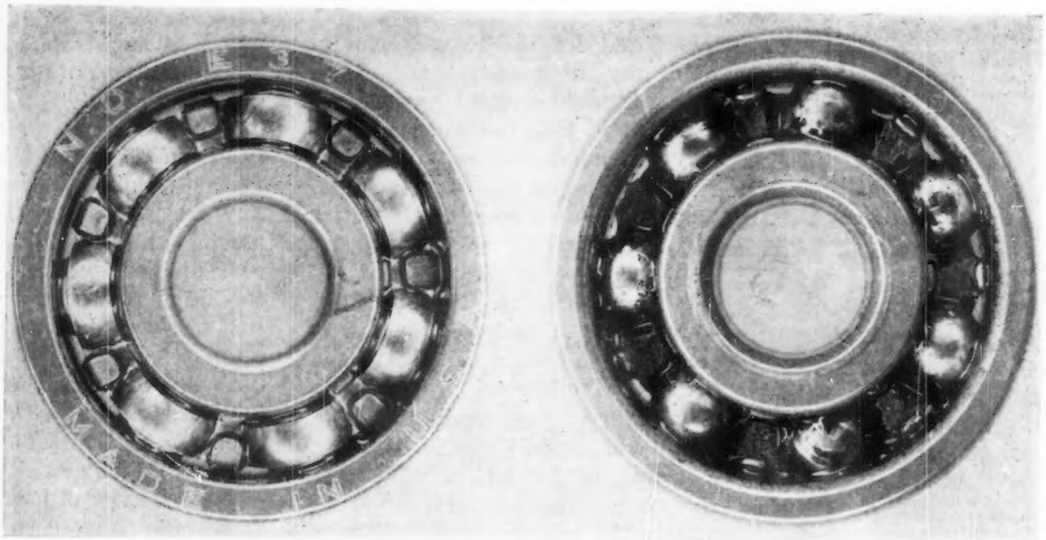
TABLE V.—ORDER OF SUITABILITY OF LUBRICANTS.

Lubricant	Storage[a]	Volatility[b]
A.........	1	4
B.........	3	2
C.........	4	1
D.........	6	3
E.........	5	[c]
F.........	2	5

[a] No. 1 is best, No. 2 next best, etc.
[b] No. 1 is least volatile, No. 2 next, etc.
[c] Increased in weight during volatility test.

TABLE VI.

Lubricant	Condition of Bearings after Failure (×30)
A.....	Very little lubricant was present. Evidence of corrosion is questionable. Several bearings contained foreign matter (particles of bakelite or insulating varnish).
B.....	Very little lubricant was present with occasional gummy residue. A very small amount of spot rust was found on some retainers.
C.....	A relatively thick film of lubricant was present on the metal surfaces. Occasional spot rust was found on some retainers.
D.....	Very little lubricant was present. There was very slight rusting and slight gumming.
E.....	All bearings were stiff. A heavy gummy residue, observable with the unaided eye, was present.
F.....	About 50 per cent of the bearings were stiff. There was corrosion of retainers in several instances, and occasional foreign matter was present.

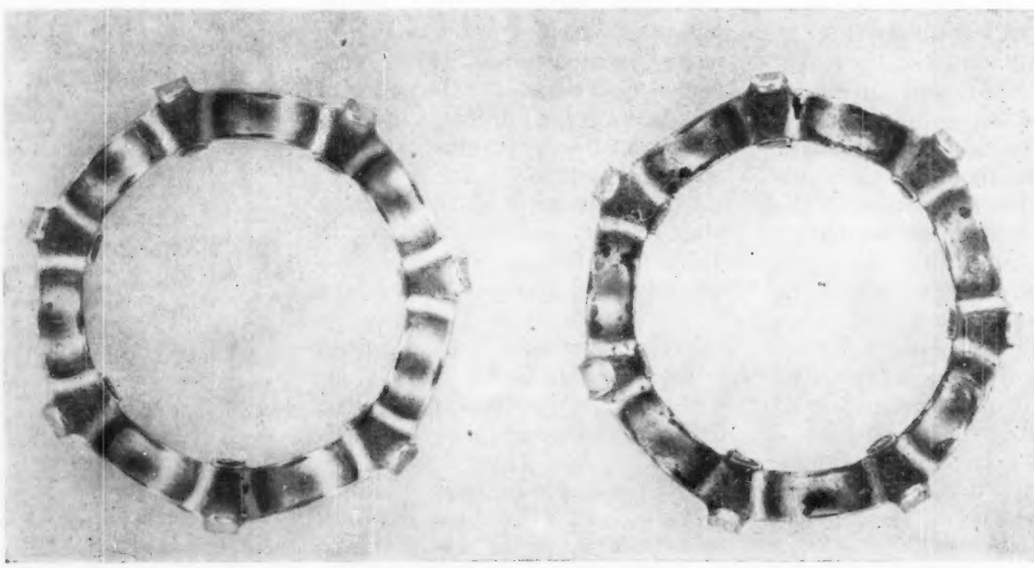


New Bearing **Bearing After Storage**

Fig. 2.—Typical Gummy Deposits Obtained with Fish Oil.

other hand, the low torque requirement of the bearing would probably cause a bearing to be unserviceable after only a trace of corrosion. Under the conditions of storage it appears that the mere presence of oil on the metal surface, the film thickness being adequate, would lead to satisfactory behavior. This is confirmed by the data on lubricant C which gave results similar to lubricant B, although its rust-preventive activity is, at most, fair. The pertinent property of lubricant C appears to be its ability to resist drainage from the metal surfaces. In actual use, where more corrosive conditions are encountered, lubricant C may be unsatisfactory because of its low rust-preventive activity. On the other hand, in prolonged storage, where the conditions are not particularly corrosive, lubricant B may not be satisfactory because of its poor oxidation stability. In this work, failure of the lubricants was encountered too soon to permit this point to be definitely settled. The volatilities of lubricants A, B, and D are of the same order of magnitude and the observed differences among these oils were probably not due to volatility. Although low volatility is an extremely desirable property for synchronous-unit lubrication, the volatility of petroleum oils is to a great extent dictated by the viscosity range required. The behavior of lubricant C may have been due to its low volatility rather than its low drainage rate, but further data are required to clear up this point. The increase in weight of the fish oil is in all probability due to oxidation. The true volatility of the fish oil may be estimated as being low in view of its low flash point.

The data obtained with the specially prepared grease are of interest. Its behavior in storage was not significantly different from the best oils. Its failure may be due to corrosion, volatilization, or oxida-



Retainer from New Bearing **Retainer from Bearing After Storage.**

Fig. 3.—Typical Rusted Retainer Obtained with Grease.

tion. It should be noted that volatilization of grease will cause a much greater increase in viscosity than corresponding volatilization of oil, since not only is the viscosity of the base oil increased, but the percentage of soap is also increased. (The viscosity increase of grease due to increase in soap concentration is greater at low rates of shear. In the limiting case of extremely high shear rates, the viscosity of grease is affected very little by the soap concentration. This is not applicable to synchronous-unit lubrication, since the rates of shear encountered are extremely low.)

It will be noted from Table II that the variance of the means is unusually high. The failure to distinguish significant differences at the 5 per cent level between the behavior of lubricants A, B, C, and F is probably due to this reason. There are relatively large errors associated with the method and manipulation and these are summarized below (the errors of apparatus, except for that inherent in the Selsyn motor which is really an error of method, are relatively low and will not be given):

(*a*) *Errors of Method.*—The angular error inherent in the synchronous unit is approximately 0.6 deg., since this is the average angular error of new units assembled under conditions approaching the ideal and using new, specially selected bearings. Approximately half of this error is an electrical error completely independent of the lubricated system. The increase in error required for failure of a particular lubricant is only 0.4 deg. Since changes of low magnitude in the lubricated system result in failure and since the mean difference in angular error of two repeaters (when tested with the same transmitter) is of the order of 0.2 deg., there is difficulty in attributing failure to differences in properties and the variance of angular error determinations is high.

(*b*) *Errors of Manipulation.*—

1. Corrosion during assembly and disassembly of units for test.
2. Entrance of dust during assembly and disassembly.
3. Error due to orientation of the bearing in its seat.
4. Change in drainage conditions because of change in orientation of the bearing in the oven after angular error tests.

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The Evaluation of Surface-Active Agents

By Jay C. Harris[1]

Continued from ASTM Bulletin No. 140, May, 1946

EVALUATION METHODS

1. Acid Stability

Scope:

This qualitative method provides an indication of acid stability over an acid concentration range of from 0.1 to 10.0 per cent, with other intervals of 1.0 and 3.0 per cent.

Apparatus:

250-ml. wide-mouth extraction flasks.
Allihn condensers, four-bulb.
Porous plate fragments.

Procedure:

Transfer 100 ml. of a solution containing 1.0 g. of agent to a 250-ml. wide-mouth extraction flask and add a piece of porous plate to prevent bumping. Attach condenser.

Bring to the boil and record appearance. Add 0.1 per cent (1 ml. of 10 per cent) sulfuric acid and boil 15 min. Record appearance. Lack of stability is exhibited by turbidity, separation of an oil, and loss of lathering power.

If no change occurs or the change is minor, add acid to provide 1 per cent acidity (0.5 ml. of concentrated sulfuric acid) through the condenser. Boil for 15 min. and again record appearance.

If no change occurs, or the change is minor, add acid to provide 3 per cent acidity (1.0 ml. of concentrated sulfuric) and boil a further 15-min. period.

If the product is still stable add sufficient acid for 10 per cent concentration (6.5 ml. concentrated sulfuric). Again boil 15 min. If no change occurs record this fact and discontinue test. At this acid concentration there may be a separation of oil which may perhaps be sulfonic acid insoluble at the conditions prevailing. Dilute with an equal volume of water and agitate vigorously to determine whether foaming power has been destroyed. If separated sulfonic acid has resulted this test will indicate its stability but relative insolubility.

Record stability as "stable," "partially decomposed," or "decomposed" at the acid concentrations indicated.

NOTE.—DISCUSSION OF THIS PAPER IS INVITED, either for publication or for the attention of the author. Address all communications to A.S.T.M. Headquarters, 1916 Race St., Philadelphia 3, Pa.

[1] Central Research Dept., Monsanto Chemical Co., Dayton, Ohio.

2. Alkali Stability

Scope:

This qualitative test is used to determine the physical "salting-out" of a product, as well as its chemical stability. A quantitative test may be made by running a saponification number, but for most purposes this expedient is unnecessary.

Apparatus:

250-ml. wide-mouth extraction flasks.
Allihn condensers, four-bulb.
Porous plate fragments.

Procedure:

Dissolve 1.0 g. of sample in 74 ml. of water. Add 25.0 g. of sodium hydroxide (c.p.) and a small piece of porous plate and swirl to dissolve the sodium hydroxide. Record appearance of system after sodium hydroxide is dissolved.

Boil under reflux for 15 min. and again record appearance which most generally will be a salting-out effect.

Cool the contents of the flask. Decant the solution through a fluted filter.

Transfer the insoluble agent from the paper to a beaker containing 25 ml. of distilled water. Add 3 drops of methyl orange indicator solution, stir and titrate with dilute acid to a faintly acid end point.

Stir thoroughly, heat to boil, permit to cool to room temperature, and note separation of oil. If oil separates under these conditions, and material has proven unstable to dilute acid, record the material as being "unstable." If the insoluble material completely dissolves in acidified solution and shows no separation, consider the product as "stable."

3. Caustic Soda Solubility

Scope:

This determination of solubility is of sufficient accuracy to serve as a means for classifying the surface-active materials.

Reagents:

Solution sodium hydroxide, c.p., 30 g. per 100 g. of solution.

Equipment:

1-liter Erlenmeyer flask.
Dispensing burette.

Procedure:

Dissolve 1.0 g. agent in 9.0 g. distilled water, add 90 g. of 30 per cent sodium hydroxide solution and transfer to a 1-liter Erlenmeyer flask. Rinse the beaker in which the solution was prepared into the flask with small increments of distilled water. Continue the addition of distilled water either until the solution becomes clear and free from undissolved particles, or when 900 ml. of water have been added.

The surface tension of the resultant solution is measured at 25 ± 1 C.

Calculation:

Percentage agent

$$= \frac{1.0}{\text{weight water (g.)} + 99\text{ g.}} \times 100$$

Percentage NaOH

$$= \frac{27.0}{\text{weight water (g.)} + 73\text{ g.}} \times 100$$

4. Metallic Ion Stability

Scope:

This method is designed to show the relative stability of solutions of surface-active agents toward metallic salts. The solutions are "normal" in that no attempt is made to adjust the pH values of the solutions of either the agents or the metallic salts.

Sample:

1.0 per cent solution in distilled water.

Metallic Salt Solutions:

1.0 per cent solutions (dry weight basis) of the c.p. salts shown in table A are used.

Dissolve the required amount of salt in water, cool if necessary, and make up to volume.

Equipment:

50-ml. Erlenmeyer flasks.
Mohr measuring pipettes.

Procedure:

Transfer 10-ml. volumes of 1 per cent surface-active agent solution to each of nine Erlenmeyer flasks.

Add solution of metallic salt dropwise from a Mohr measuring pipette to the solution of surface-active agent table A until the solution becomes turbid or precipitation is noted. Record the volume of metallic salt solution used, and heat the flask containing the mixture to the boil. If the solution becomes clear, add additional metallic salt until one of several occurrences takes place:

1. Until 10 ml. of metallic salt solution has been added.
2. Until type of the following character is no longer clearly discernible through the transverse layer of solution.

SIGNATURE________

3. Terminate the test when the addition of metallic salt causes no further precipitation or when lather no longer is formed.

The total volume of metallic salt solution used to attain the end point is recorded.

Calculation:

Metallic ion stability = volume metallic ion solution × 10

TABLE A.

Salt	Weight for 1 per cent (Dry Basis) g. per 100 ml.
$CaCl_2 \cdot 2H_2O$	1.327
$MgSO_4 \cdot 7H_2O$	2.048
$CuSO_4 \cdot 5H_2O$	1.564
$Al_2(SO_4)_3 \cdot 18H_2O$	1.948
$BaCl_2 \cdot 2H_2O$	1.173
$FeSO_4 \cdot 7H_2O$	1.829
$Pb(NO_3)_2$	1.000
$ZnSO_4 \cdot 7H_2O$	1.781
$Ni(NO_3)_2 \cdot 6H_2O$	1.591

5. Surface and Interfacial Tension Measurements

Scope:

Measurements of surface and interfacial tension using the du Nouy precision tensiometer can be made accurately by the application of the proper corrections, or the dial reading may be used with adequate accuracy for control work.

Apparatus:

Either the precision (surface tension) or interfacial tensiometers may be used.

Calibration:

1. Level the tensiometer.
2. Adjust the torsion wire until it is taut.
3. Adjust vernier of scale to zero.
4. Adjust platinum ring.
5. Place piece of paper on ring and adjust until index level of arm is opposite reference line of mirror (thus compensating for weight of paper).
6. Place weights totalling 600 mg. on paper platform.
7. Turn adjusting head (controlling dial reading) until the index level of the arm is opposite the reference line of mirror. Record dial reading to 0.10 division.
8. Calculate scale reading as follows:

Weight added to ring (M) = 0.600 g.
Mean circumference of ring (L) = 4.00 cm.
Acceleration of gravity (G) = 980.3 cm. per sq. sec. (at Chicago).

$$Y = \frac{MG}{2L} = \frac{0.600 \times 980.3}{2 \times 4.00} = 73.52 \text{ dynes}$$

per cm.

For the interfacial tensiometer substitute the pertinent values in the above equation.

9. If the recorded value is greater than the calculated value of 8, shorten the torsion arm, or lengthen it if the recorded value is less.

10. Repeat the calibration procedure, readjusting to the zero position after each change of torsion arm length until the dial reading corresponds to the calculated value.

11. Adjust the dial reading to zero, remove the weights and the paper platform and readjust so that the torsion arm indicator is in alignment with the reference line of the mirror.

Precautions:

1. The wire of the ring should lie in one plane, be horizontal, and round.
2. The vessel holding the liquid should be large enough so that curvature of the free surface shall have no effect upon the shape of the liquid column raised by the ring.
3. The liquid surface should be free from motion.
4. The ring should be only *very slowly* raised.
5. There should be no evaporation or coating of the surface.

Procedure:

Prepare 1.0 per cent solutions of the agents in distilled water. Retain a portion for dilution. Determine surface tension by averaging four measurements. The reading is taken at the point where the film breaks, while every effort is made to maintain the torsion arm indicator exactly opposite the reference line of the mirror. The interfacial tension measurement is made by immersing the ring in the aqueous layer, then carefully flowing a sufficient depth of layer of paraffin oil (Nujol) over the aqueous surface that the inverted V of the ring shall at all times during the measurement be immersed in the oil. The measurement is carefully made, since extremely low interfacial tensions are hard to discern, and in some instances no more than one measurement may be made because of preferential wetting of the ring by the oil. The results are averaged and recorded.

The ring is cleaned between determinations by immersion in turn in carbon tetrachloride and dilute hydrochloric acid solution followed by flaming.

Similar readings are obtained for 0.25 per cent solutions of the agents, and 0.0625 per cent solutions.

Corrections for surface tension measurements may be made by reference to calibrations such as Fig. 1 or to the data developed by Harkins and Jordan (**2**) or Zuidema and Waters (**8**) for interfacial measurements.

Supplementary directions and description of the du Nouy equipment may be found in the manufacturer's catalog (**25**).

6. Lime Soap Dispersion

Scope:

This quantitative method is useful for determining whether auxiliary agents possess the property of dispersing relatively large amounts of lime soap.

Reagents:

2.3 per cent sodium oleate (dry weight). Either pure sodium oleate or oleate flake soap.
0.34 per cent $CaCl_2$ solution
0.2 *N* HCl
Methyl orange-xylene cyanole indicator solution. (Eastman No. 2216).
10 per cent volume solution of auxiliary agent under investigation

Procedure:

1. Add 1-ml. increments of auxiliary or dispersing agent up to 8 ml. to separate 20-ml. volumes of 2.3 per cent soap solution in 125-ml. flasks. The solutions are then shaken and to them are added 25 ml. of 0.34 per cent calcium chloride solution. Heat for 15 min. on a water bath, then suction filter through a prepared No. 4 Whatman paper on a Gooch crucible. The flask and crucible are then washed with three 10-ml. portions of distilled water. If complete filtration is impossible with 8 ml. of auxiliary agent, this fact is recorded without further examination.

2. The filtered solutions are titrated with 0.2 *N* HCl to the xylol-cyanole end point, which is gray in color. A blank for each agent comprising 20 ml. of soap solution, 25 ml. of calcium chloride solution, and the volume of auxiliary agent required, are titrated without filtration. When the filtered test sample has a titration value practically equal to that of the blank, the volume of auxiliary agent required to produce complete dispersion is recorded.

3. The results are expressed as centigrams of auxiliary agent required to disperse 45.5 mg. of calcium oleate formed. One milliliter of auxiliary agent is equal to a dispersion number of 10.

Calculation:

$$\text{Dispersion number} = \text{Milliliters auxiliary agent} \times 10$$

7A. Draves-Clarkson Wetting Test

Scope:

This method is intended for the practical evaluation of wetting agents useful for textile processing. (AATCC method described in 1935–1936 Yearbook. A relatively recent variation in the test has been made using a heavier hook.)

Equipment:

500-ml. graduate.

Hook or sinker, 1.50 g. in weight (of No. 12 B. and S. gage copper) with 1/4-in. hook opening.

Anchor, 20 g. in weight.

Skeins:

A 5.0-g. skein of two-ply (70/2 combed peeler yarn) is prepared such that an 18-in. loop can be formed. The yarn may best be standardized against a standard sample of wetting agent, adjusting the weight of skein to yield a specific wetting time.

Wetting Test:

1. Prepare 500 ml. of 1.0 per cent test solution.
2. Transfer 250 ml. of 1.0 per cent solution to a 600-ml. beaker, add 250 ml. distilled water and adjust the temperature to 25 ± 1 C.
3. Transfer the temperature-adjusted 0.50 per cent solution to a 500-ml. graduate.
4. Attach the hook or sinker to the 18-in. loop, hold the skein in the middle and cut the end opposite the hook.
5. Transfer the hook, anchor, and skein to the graduate of solution and dip the hook into the solution until the surface is just touched, then drop the skein and start the stopwatch simultaneously.
6. The sinking time is attained when the skein sinks, and the hook just reaches the level of the anchor, at which time the stopwatch again is snapped.
7. Repeat steps 4, 5, and 6 until five replicate skeins have been tested, using the same solution throughout.
8. In a manner similar to step 3, prepare an 0.25, 0.125, 0.0625 or further dilution until a wetting time in one dilution of +180 sec. is attained for two replicate skeins. The test is then terminated.
9. The mean values for each dilution shall then be reported.

Note.—This test is applicable to acid, alkaline, or saline conditions.

7B. Canvas Disk Wetting Test

Scope:

This method is intended for the practical evaluation of wetting agents against a textile material.

Equipment:

No. 6 Mt. Vernon duck.
Steel die, 1 in. in diameter.
Carbon filter tube of 75-mm. stem and 38-mm. inside top diameter.
600-ml. Griffin beaker with spout.

Disks:

The disks may best be cut using a 1-in. steel die. Cut the disks on a smooth, hardwood surface. The disks for use must be flat and free from rough edges and ravelings. Cut the disks from the fabric area bounded by 1 in. within either side of the selvedge.

Wetting Test:

1. Transfer 500 ml. of test solution at 25 ± 1 C. to a 600-ml. beaker.
2. Drop the flat canvas disk into the funnel and quickly invert and immerse in the test solution.
3. Start the timer as soon as the disk enters the solution. The individual test is considered as terminated when the disk first begins to sink.
4. Four replicate tests shall be made for each dilution tested.
5. The average results shall be reported as seconds wetting time for each of the concentrations tested, which shall be 0.5, 0.25, 0.125, 0.0625 or further dilution until the disks give wetting times greater than 180 sec., at which point the test shall be terminated.

Note.—This test is applicable to acid, alkaline, or saline conditions.

The test equipment should be so aligned that a disk held horizontally by the filter tube should be 1 in. below the surface of the liquid.

8. Lather Values

Scope:

This method for evaluation of lathering agents provides quantitative, reproducible data and is essentially that described by Ross and Miles (23).

Apparatus:

Level cylinder so that drops fall vertically into center of liquid at bottom of cylinder.

Solution Preparation:

1. Dissolve sample in distilled water at double the concentration desired by bringing to the boil then cooling to 25 C.
2. Make back to weight with distilled water for loss by evaporation.
3. Dilute to correct concentration by using water at 25 C. of double the hardness or strength finally required.

Procedure:

1. Start circulation pump on column to maintain temperature at 25 ± 0.2 C.
2. Rinse cylinder walls with distilled water, drain 10 min. and close stopcock.
3. Age solution for 10 min. in constant temperature bath at 25 ± 0.2 C.
4. Wet down walls of cylinder with 50 ml. of test solution by washing walls in circular motion with 50-ml. pipette of solution.
5. Immediately transfer 200 ml. of test solution to tipped pipette. Insert in holder in position vertical to base and open stopcock.
6. Record lather height in centimeters, at once, and in 5 min.
7. Drain cylinder, rinse with distilled water, and permit to drain for 10 min.
8. Repeat steps 4 through 7 for next sample making one determination for each sample.

9. Organic Solvent Solubility

Scope:

This solubility method is of sufficient accuracy since data regarding approximate solubility only are desired.

Sample Weight:

0.50 g.

Equipment:

16-oz. glass stoppered bottles.
Dispensing burettes.

Temperature:

25 ± 3 C.

Solvents:

Transfer 0.50 g. of sample to the glass-stoppered bottle. Add 1.0 ml. of solvent, shake thoroughly, and determine whether solution has taken place. Continue adding increments of solvent, either until solution is effected, or until 450 ml. of solvent has been added.

Calculation:

Percentage Solubility

$$= \frac{0.50}{\text{volume solvent} \times \text{sp. gr.}} \times 100$$

10. Detergent Test

Scope:

This controlled laboratory method for detergent testing is capable of the evaluation of detergents upon a numerical comparative basis.

Equipment:

Mechanic applicator with thermostatic control.
Launderometer, speed of rotation set at 40 ± 2 rpm.
Beckman glass electrode hydrogen-ion apparatus.
Lange photoelectric photometer.

Standard Soil:

Wesson oil 7.5 g.
Oildag (Acheson Graphite) 30.0 g.
Carbon tetrachloride (tech.) 18 liters.

Fabric:

Indianhead (permanent finish) 54 by 48 thread count. This is desized in strips 16 ft. in length by 6½ in. in width. The fabric is first boiled 10 min. in 0.1 *N* NaOH solution, taking care to maintain the fabric below the solution surface at all times. The caustic solution is poured off and a rinse of from 700 to 800 ml. of hot water is poured over the fabric, and squeezed in thoroughly, then drained.

A solution of 5 g. of white (unbuilt) flake soap in 1100 ml. of distilled water is meanwhile prepared and brought to the boil. The rinsed fabric from the caustic desizing bath is then transferred to the boiling soap bath and boiled for 10 min. with adequate agitation. The soap solution is then drained from the fabric and rinsed first with hot, and finally cold, distilled water until soap-free. (Test final rinse water with methyl orange indicator against a blank of distilled water.) The strips are then run through a wringer or centrifugal extractor

and ironed flat and dry on a flat-plate ironer, being careful to adjust the heat to prevent scorching.

Soiling:

The strips of desized fabric are equipped with leaders and are passed through the soiling solution at a rate of about 1 ft. per min., thence through a heated, counter-current forced-draft oven. Four passes through the soiling apparatus are made, and the strips then are festooned in a circulatory type draft oven at 75 C. for 15 min. The fabric is aged at room temperature for 1 day, then used over the next 7-day period.

Washing:

The conditions observed are as follows:
Fabric: solution ratio = 129.
Number of replicate swatches = 2.
Number of washes = 4.
Duration of wash = 10 min.
Volume of wash solution = 100 ml. discarded after each wash.
Temperature of wash = 140 ± 2 F.
Number of rinses = two of water hardness in use.
Washing apparatus = standard Launderometer.
Number of rubber balls used = 10.
Speed of rotation of Launderometer = 40 ± 2 rpm.
Lather = estimated at second wash. Cannot be greater than 4 in.

Strips of fabric 6 by 6½ in. are cut from the 18-ft. strips. One swatch is retained as the soil standard. The individual detergent test is made in duplicate, placing each of two soiled swatches in separate Launderometer jars with 100 ml. of detergent solution at 140 F. with 10 rubber balls. The swatch is washed exactly 10 min., removed, the detergent solution discarded, and a 1½-in. strip of fabric removed from the 6 by 6½-in. strip. The larger swatch is washed again in exactly the same manner and another 1½-in. strip removed. The washing is continued until four washes have been given of 10, 20, 30, and 40 min. duration (duplicate tests).

Evaluation of Swatches:

The Lange photoelectric photometer is used to measure the degree of soil removal. White, unsoiled but desized Indianhead fabric was used as 100 per cent white (maximum whiteness attainable) and the standard soil used in the particular test was used as 0 per cent white or 100 per cent black. On this basis, soil removed during the washing operation was measurable as direct percentage soil removal.

The method for reducing the test results to a single significant figure is as follows: The wash test results for each of the duplicate 10-min. washes are averaged, and an average calculated from these four. This corresponds to a percentage soil removal value based upon the following equation:

$$\text{Per cent Soil Removal} = \frac{A + B + C + D}{4}$$

As a means for control a standard sample of detergent is tested with each Launderometer load of samples.

Acknowledgment:

I am indebted to Dorothy M. Greene and Earl L. Brown who developed the foregoing data utilizing the described methods.

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Report on Determination of Soap, Free Fat, and Mineral Oil in Grease—Chemical and General Tests

Project No. 1, Technical Committee G, Section I, of A.S.T.M. Committee D-2 on Petroleum Products and Lubricants

Prepared by Gus Kaufman[1], Chairman, Section I

THE first report of this group covers the work done on improvements in the present Standard Methods of Analysis of Grease (D 128 - 40).[2] This method D 128 was first issued in 1927 and has been used with considerable success since that time, with only minor changes in the procedure. Although the basic principles involved are still applicable, certain shortcomings in the method have been called to the attention of Technical Committee G. Some of these deficiencies and the improvements anticipated by the revised procedure are as follows:

1. The A.S.T.M. procedure provides that the grease be decomposed by shaking in the cold in a separatory funnel with hydrochloric acid. This procedure is either tedious or completely inapplicable to some of the harder greases. In addition, it does not determine acid-soluble fillers, which would be dissolved by the hydrochloric acid.

The modified method utilizes inert solvents (hot benzene and alcohol), which dissolve the grease without decomposing the filler.

2. The A.S.T.M. method specifies the use of the ash analysis for calculation of soap when more than one base is present.

The modified procedure specifies a qualitative test for soap since serious error might result if fillers are present.

3. Mineral oil as separated by the A.S.T.M. method may contain small amounts of soap, which can affect viscosity and other constants of the oil.

This difficulty is corrected by acidification of the naphtha solution of the oil, thereby converting the small amount of soap remaining to fatty acids, which would have only a minor influence on the mineral oil viscosity.

4. The A.S.T.M. method requires the use of granular $KHSO_4$ for decomposition of greases containing asphaltic or tarry material. With many greases, particularly those containing little or no water,

TABLE I.—COOPERATIVE SOAP DETERMINATIONS—A.S.T.M. TECHNICAL COMMITTEE G, SECTION I, PROJECT 1.

	Sample GI-1-Sodium Soap, per cent		Sample GI-2-Calcium Soap, per cent		Sample GI-3 (Mixed Base-Na-Ca)-Sodium, per cent	
	A.S.T.M. Method	Proposed Method	A.S.T.M. Method	Proposed Method	A.S.T.M. Method	Proposed Method
California Research	13.0	13.2	13.6	16.8	12.4[c]	12.6[c]
	13.0	13.2			12.4	12.5
Pure Oil Co.	14.4	15.5[a]	17.5	14.0[a]	14.2	14.1
	14.4	13.8[a]	17.4	14.3[a]	14.2[c]	14.3
Sinclair	13.0	12.9	16.7	16.5	11.1[e]	11.5[d]
Socony Vacuum	13.1	13.3	15.9	16.9	12.2[c]	12.3
	12.8	13.2	16.4	16.9	12.3	12.3
Standard Development	12.4	12.6	15.9	16.5	10.1[e]	9.9
Standard Indiana	12.7	12.9	16.2	16.2	10.2[f]	10.0[f]
	12.7	12.9	16.3	16.1	10.5	10.4
The Texas Company	13.2	12.9	14.2[a]	16.6	9.7[f]	10.4[f]
	13.3	13.0	13.6[a]	16.6	9.4	10.4
Union Oil Co.	12.9	13.1	15.4	16.6	10.7[g]	10.5[g]
Average[b]	13.2	13.0	16.4	16.6	Not determined because of incomplete data	
Standard deviation of individual value from average[b]	0.60	0.20	0.74	0.27		

[a] Rejected basis statistical analysis (more than twice standard deviation from average).
[b] Not including rejected values.
[c] Did not report calcium soap.
[d] Reports 1.52 per cent calcium soap.
[e] Reports 2.5 per cent calcium soap.
[f] Reports 2.3; 2.5 per cent calcium soap.
[g] Reports 2.13; 2.17 per cent calcium soap.

TABLE II.—COOPERATIVE FREE NEUTRAL FAT DETERMINATIONS IN PER CENT—A.S.T.M. TECHNICAL COMMITTEE G, SECTION I, PROJECT 1.

	Sample GI-1		Sample GI-2		Sample GI-3	
	A.S.T.M. Method	Proposed Method	A.S.T.M. Method	Proposed Method	A.S.T.M. Method	Proposed Method
California Research	0.1, 0.1	0.1, 0.2	1.0, 1.2	1.0, 1.1	0.10, 0.30	0.30, 0.40
Pure Oil Co.	0.13, 0.14	0.12, 0.10	0.16, 0.16[a]	0.10, 0.09[a]	0.09, 0.09	0.06, 0.07
Sinclair	0.14	0.63	1.01	1.25	0.28	0.20
Socony Vacuum	0.5, 0.6	0.8, 0.8	0.6, 0.7	1.50, 1.50	0.6, 0.7	0.60, 0.70
Standard Development	0.63	0.47	1.24	1.27	0.34	0.36
Standard of Indiana	0.27, 0.35	0.21, 0.26	1.43, 1.39	2.60, 2.67	0.28, 0.26	0.50, 0.53
The Texas Company	0.6, 0.7	0.4, 0.5	2.1, 2.3[b]	1.50[d], 1.70	0.7, 0.8	0.50, 0.60
Union Oil Co.	0.16[c]	1.16[c]	2.09[c]	1.35[c]	0.10[c]	0.42[c, e]
Arithmetical average	0.34	0.37	1.37	1.64	0.35	0.40

[a] Not included in average.
[b] By saponification number; by weight = 2.0, 2.4.
[c] By weight.
[d] By saponification number; by weight = 1.7, 1.9.
[e] Contaminated.

TABLE III.—COOPERATIVE MINERAL OIL DETERMINATIONS IN PER CENT—A.S.T.M. TECHNICAL COMMITTEE G, SECTION I, PROJECT 1.

	Sample GI-1		Sample GI-2		Sample GI-3	
	A.S.T.M. Method	Proposed Method	A.S.T.M. Method	Proposed Method	A.S.T.M. Method	Proposed Method
California Research	85.8	85.8	81.2	80.8	85.8	85.9
	85.9	85.7	81.2	81.0	85.8	86.0
Pure Oil Co.	85.0	84.2	81.0	81.3	84.7	85.0
	84.7	84.9	81.0	83.0[a]	85.0	82.9[a]
Sinclair	86.0	85.6	82.0	81.3	85.1	85.2
Standard of Indiana	86.1	86.6	81.1	79.4	85.6	85.0
	86.3	86.4	81.0	79.5	85.9	85.4
Standard Development	85.2	84.8	80.2	80.9	85.2	85.9
Socony Vacuum	85.9	85.8	80.2	81.6	83.3[a]	82.1[a]
	85.7	85.6	79.5	81.6	82.1[a]	83.4[a]
The Texas Company	85.7	85.3	82.2	80.6	85.7	85.0
	85.5	85.5	83.0	80.4	86.0	85.1
Union Oil Co.	85.8	...	82.0	80.8	84.9	85.3
Average[b]	85.7	85.5	81.2	80.8	85.4	85.4
Standard deviation of an individual value from the average[b]	0.47	0.66	0.94	0.71	0.46	0.41

[a] Rejected basis statistical analysis (more than twice standard deviation from average).
[b] Not including rejected values.

[1] The Texas Company, New York, N. Y.
[2] 1944 Book of A.S.T.M. Standards, Part III, p. 182.

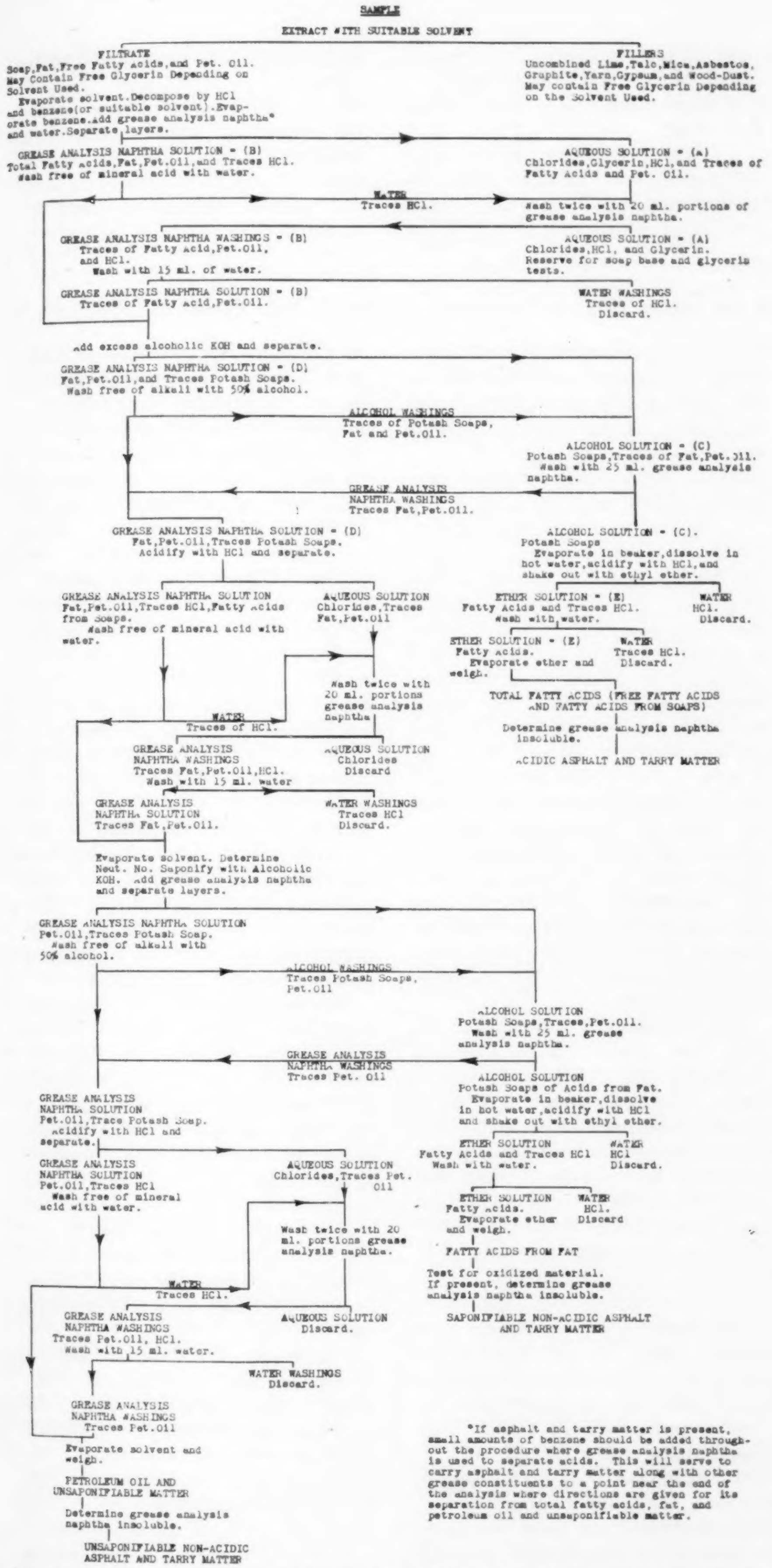


Fig. 1.—Modified A.S.T.M. Method of Analysis of Grease Under Investigation by Technical Committee G.

it is practically impossible to obtain a reaction with this reagent.

Although this difficulty can be obviated by the addition of small amounts of water and benzene, the proposed method eliminates this difficulty by decomposing asphaltic and tarry greases with hydrochloric acid, followed by small additions and rinsings of warm benzene.

The work covered herein embraces cooperative tests carried out by some eight laboratories for the determination of soap, free neutral fat, and mineral oil. It is proposed to work on other phases of the analysis later. Figure 1 is a diagrammatic sketch of the proposed method.

In the first cooperative tests the samples of grease were so chosen as to be favorable to the present A.S.T.M. procedure, inasmuch as they did not embrace dark colored or hard greases. The greases chosen comprised a sodium-base, a calcium-base, and a sodium-calcium-base grease, which were analyzed for soap content, free neutral fat content, and mineral oil content by the present and proposed methods.

Results of the cooperative tests are given in Tables I, II, and III. Based on the data and comments from the laboratories participating, the following conclusions can be drawn:

1. A majority of the laboratories found that the proposed procedure resulted in easier manipulation due to fewer emulsions.

2. Analysis of the data showed a somewhat better agreement between laboratories for soap and mineral oil content by the proposed procedure in comparison with that of A.S.T.M., although it is emphasized that this difference is necessarily very slight, since in selecting the greases in the first cooperative tests, the A.S.T.M. method was given an opportunity to show up in the more favorable light. The soap content tended to be higher by the proposed method, indicating the possibility of more complete decomposition of the original grease.

3. Regarding free-fat determinations, both methods showed poor reproducibility, which may have been due to the small amounts of fat present and to the fact that

alternate procedures were permitted. In the next series of tests it is hoped to resolve these difficulties.

4. The section on calculations in the proposed procedure is, in general, considered an improvement over the corresponding section of A.S.T.M. Method D 128 – 40.

Future work will consist of the following:

1. The cooperating laboratories will repeat the free neutral fat determinations on the grease samples previously submitted, as well as on additional samples which will be distributed.

2. The additional grease samples will consist of greases difficult to analyze by the present method; that is, hard, black types of greases and greases containing asphaltic material.

Report of the Joint Committee on Filler Metal Presented at the 1946 Annual Meeting

THE JOINT A.W.S.-A. S. T. M. Committee on Filler Metal, through its subcommittees, has continued the formulation of standards for filler metal. While no new specifications have been issued during the past year, the Tentative Specifications for Iron and Steel Gas-Welding Rods (A 251–42 T), under the jurisdiction of Subcommittee II (J. H. Critchett, chairman) have been editorially revised and will be submitted for approval shortly. Several specifications are under consideration at present and should be submitted for approval in the near future. These are indicated in the following reports of the respective subcommittees.

Activities of Subcommittees

Subcommittee I on Iron and Steel Arc-Welding Electrodes (J. H. Deppeler, chairman).—This subcommittee has devoted the past year to a revision of the Tentative Specifications for Iron and Steel Arc-Welding Electrodes (A 233–45 T). The Guide to the A.W.S.-A.S.T.M. Classification of Iron and Steel Arc-Welding Electrodes, which appears in an Appendix to Specifications A 233, is also being reviewed. When this revision is completed, the revised specifications will be referred to a letter-ballot vote of the Main Committee.

Subcommittee II on Iron and Steel Gas Welding Rods (J. H. Critchett, chairman).—See above.

Subcommittee III on Aluminum and Aluminum-Alloy Filler Metal (G. O. Hoglund, chairman).—This subcommittee has prepared the Tentative Specifications for Aluminum and Aluminum-Alloy Metal Arc-Welding Electrodes (B 184–43 T). No changes were made in these during the past year. The subcommittee has been active and made progress during the year compiling proposed specifications for gas-welding rods for aluminum and aluminum alloys. The first draft covered only two grades of wire suitable for welding wrought materials. Consideration made it evident that at least five more grades, which concerned primarily the filler rod for castings, should be added. Members of the subcommittee raised certain questions in connection with analogies in the redrafted specifications among some compositions of filler metal. No direct data were available on which to base the specifications without using analogous items. It has become necessary to conduct tests to get the actual data to substantiate the requirements before submitting the specifications to the main committee. In addition it is expected that the classification numbers will be changed to the general system outlined at a meeting of the subcommittee chairmen.

Subcommittee IV on High-Alloy Steel Filler Metal (R. D. Thomas, chairman).—A third and fourth draft of the proposed Tentative Specifications for Stainless Steel Electrodes has been drawn up and submitted to the subcommittee for vote. A further revision will be ready to submit to the full subcommittee at a meeting in June and if approved, will be submitted to the main committee shortly thereafter.

Subcommittee V on Nickel and Nickel Alloys (O. B. J. Fraser, chairman).—This subcommittee has been inactive for the past year.

Subcommittee VI on Copper and Copper-Alloy Filler Metal (C. E. Swift, chairman).—A draft of specifications for copper and copper-alloy electrodes has been prepared. In regard to the classification of copper alloys, it was decided to follow the same pattern used for other metals, except that no designation would be included at this time to attempt to indicate the type of electrode coating used or the positions in which the electrodes could be used. In January a meeting of the subcommittee reviewed the proposed specifications and agreement was reached on all except two points. These were the questions of the specifications for the base metals to be used in testing the various classifications of electrodes and the labeling of electrode packages with a caution regarding the need for ventilation. These questions were submitted to the entire subcommittee membership for letter ballot and the final draft of the specifications will be based on the majority opinion of the answers received and submitted for final approval to the committee. The subcommittee has in mind the preparation of specifications for copper and copper-alloy gas-welding rods.

Subcommittee VII on Surfacing Materials (M. G. Sedam, chairman).—Organization of Subcommittee VII was started in April, 1945, and completed in May. At the first meeting of the subcommittee in March, 1946, a classification of surfacing materials according to chemical analysis was drawn up.

It was agreed by the subcommittee that chemical analysis of the weld deposit was the only logical basis upon which to base specifications.

This report has been submitted to letter ballot of the committee which consists of 66 members; 52 members returned their ballots, all of whom voted affirmatively.

Respectfully submitted on behalf of the committee,

J. H. Deppeler
Chairman

S. A. Greenberg
Secretary

Wide Range of Equipment in Seventh Apparatus Exhibit

Much New Equipment Shown

THAT THE instruments and apparatus industry is alert to many of the notable technical advances being made in testing, evaluation and control of materials, was evident at the Seventh Exhibit of Testing Apparatus and Related Equipment held during the Annual Meeting in Buffalo. Several significant new instruments were shown for the first time and many new developments since the 1941 Exhibit were stressed. What made this unquestionably one of the finest exhibits yet sponsored by the Society was the close cooperation of the commercial exhibitors in planning interesting booth displays, the cooperation and help of the Committee on Exhibits headed by D. D. Crandell, National Gypsum Co., in arranging several special booth displays which tied in with the theme of the Exhibit, and also the participation of several A.S.T.M. technical committees, each of which had rather unique booth arrangements demonstrating important features of their work.

Accurate and reliable instruments have always played an essential part in testing and evaluation of materials and the Society through the work of its technical committees has been an important force in making known the need for various instruments and aiding in their development. Thus the Exhibit, which provides members with an excellent opportunity to see what leading instrument companies have developed, has come to be considered a valuable adjunct of the Annual Meeting, where there are presented a large number of technical papers and reports dealing with the Society's work on standards and research.

The following lists of committee, noncommercial, and commercial exhibitors will give some idea of the wide range of fields which were covered in various ways in the Exhibit.

Exhibits of A.S.T.M. Technical Committees:

- A-3 on Cast Iron
- A-7 on Malleable Iron Castings
- B-1 on Wires for Electrical Conductors
- B-3 on Corrosion of Non-Ferrous Metals and Alloys
- D-2 on Petroleum Products and Lubricants—Technical Committee G on Lubricating Grease
- D-7 on Wood
- D-9 on Electrical Insulating Materials
- E-4 on Metallography (Photographic Exhibit)
- E-7 on Radiographic Testing (Photographic Exhibit)

The displays arranged by Technical Committee G on Lubricating Grease of Committee D-2, Committee A-3 on Cast Iron, and Committee D-7 on Wood, were particularly extensive. Messrs. C. W. Georgi, J. S. Vanick, and W. H. Fulweiler, respectively responsible for these displays, devoted much time and effort to them and the intensive interest which was shown by the large number of visitors to the exhibits evidenced the careful planning and the work involved in the displays.

Noncommercial (Research) Exhibits:

- Buffalo Public Library
- Cornell Aeronautical Laboratory
- Pierce & Stevens, Inc.
- Buffalo Technical High School
- National Gypsum Co.

The above displays were arranged for by the local committee on apparatus exhibit consisting of the following:

D. D. Crandell, *Chairman*, National Gypsum Co.; L. F. Hoyt, National Aniline Co.; W. H. Rother, Buffalo Foundry and Machine Co.; G. L. Lardie, Union Carbide Co.; Burt Wetherbee, General Latex and Chemical Co.; and J. Gentile, Pittsburgh Testing Laboratory.

The list of companies which took part in the commercial section of the Exhibit follows:

- Acme Industrial Co.
- American Instrument Co.
- American Optical Co.
- H. Reeve Angel & Co., Inc.
- Atlas Electric Devices Co.
- The Baldwin Locomotive Works
- Boonton Radio Corp.
- Brookfield Engineering Laboratories
- Buehler Ltd.
- Burrell Technical Supply Co.
- Canadian Radium & Uranium Corp.
- Central Scientific Co.
- The Comtor Co.
- Doble Engineering Co.
- Easman Kodak Co.
- Elgin National Watch Co.
- Engineering Laboratories, Inc.
- Gamma Instrument Co., Inc.
- General Electric Co.
- General Radio Co.
- Hanovia Chemical and Mfg. Co.
- Kewaunee Mfg. Co.
- Kimble Glass Co.
- Krouse Testing Machine Co.
- Macbeth Corp.
- Magnaflux Corp.
- National Research Corp.
- North American Philips Co., Inc.
- Tinius Olsen Testing Machine Co.
- Parr Instrument Co.
- Picker X-ray Corp.
- Precision Scientific Co.
- Radium Chemical Co., Inc.
- Rainhart Co.
- Riehle Testing Machines Division of American Machine and Metals, Inc.
- Rubicon Co.
- Scott Testers, Inc.
- Sperry Products, Inc.
- The Standard Electric Time Co.
- Statham Laboratories
- C. J. Tagliabue Division of Portable Products Corp.
- W. M. Welch Scientific Co.
- Will Corp.
- Wilson Mechanical Instrument Co., Inc.

The Exhibit was open two evenings during the week—Tuesday and Thursday—with the official opening on Monday noon and closing Friday noon. There was a steady stream of members and visitors through the Exhibit and this excellent attendance is an indication of the intensive interest in the whole field of apparatus, instruments and laboratory supplies.

Rivets and Bolts in Structural Design

AN INTERESTING condensed article appears in the magazine *"Fasteners"* published by the American Institute of Bolt, Nut, and Rivet Manufacturers, dealing with "Rivets and Bolts in Structural Design." Prepared by F. H. Frankland, Consulting Engineer, New York, and chairman of the A.S.T.M. subcommittee concerned with structural steels, there are numerous references to requirements in A.S.T.M. specifications including High-Strength Structural Rivet Steel (A 195), Structural Rivet Steel (A 141), and Steel for Bridges and Buildings (A 7).

Interesting 1946 Photographic Exhibit

Radiographic and Photomicrographic Sections

ONE OF the very interesting features of the Annual Meeting this year was the 1946 Photographic Exhibit with sections on radiography and photomicrography. This was the fifth such exhibit, the last one having been held in 1941. Arranged under the auspices of a Buffalo Committee in charge of the exhibit, headed by F. L. Koethen, Enterprise Oil Co., the exhibit stressed the theme "Materials, Testing and Research." Cooperating with the local committee closely were representatives of Committees E-7 on Radiographic Testing and E-4 on Metallography, the latter two groups being responsible for the Sections on Radiography and Photomicrography. The personnel of the Photographic Committee follows:

F. L. Koethen, *Chairman*, Enterprise Oil Co.

George Beiser, Bell Aircraft Corp.

F. E. Birkett, Pratt & Lambert, Inc.

R. F. Cameron, Wickwire Spencer Steel Div., Colorado Fuel and Iron Corp.

Frank Fosbury, National Gypsum Co.

G. M. O'Neill, Niagara Alkali Co.

Ex-Officio Member: T. L. Mayer, Buffalo Public Library; Vice-Chairman, and Acting Chairman, General Buffalo Committee on Arrangements for 1946 Annual Meeting

REPRESENTING COMMITTEE E-4 ON METALLOGRAPHY:

L. V. Foster, Bausch & Lomb Optical Co.

R. F. Cameron, Wickwire Spencer Steel Div., Colorado Fuel and Iron Corp.

REPRESENTING COMMITTEE E-7 ON RADIOGRAPHIC TESTING:

H. E. Seemann, Eastman Kodak Co.

Herbert Mermagen, University of Rochester

Much credit should be given to this committeee for devoting very considerable time and effort in planning and arranging the exhibit and also in the judging. The entries in the Radiographic Section were noncompetitive and in the Photomicrographic Section the judging was done by a committee consisting of Messrs. L. L. Wyman, General Electric Co.; J. J. Bowman, Aluminum Company of America, chairman and secretary, respectively, of Committee E-4, with L. V. Foster, Bausch & Lomb Optical Co., and R. F. Cameron, Wickwire Spencer Steel Div., Colorado Fuel and Iron Corp.

There were many extremely interesting entries with quite a number in color, and numerous radiographs and transparencies were displayed in illuminators so that all those attending the meeting had an opportunity of inspecting everything which had been accepted for display. Aside from the opportunity given A.S.T.M. members who are concerned with photography and its various branches either from the amateur or professional angle to show some of their work, and at the same time affording an interesting sidelight for the Annual Meeting, the photographic exhibit as a whole stresses the part which good illustration can have in connection with the Society's fields of work. The large number of entries in the section on photomicrography were particularly impressive and the several examples of electron micros were notable.

A complete list of the award winners follows:

List of Winners
1946 A.S.T.M. Photographic Exhibit
Hotel Statler, Buffalo, N. Y.

GENERAL SECTION

NON-PROFESSIONAL. BLACK AND WHITE OR MONOCHROME PRINTS

First: *Oil Quenching of Steel*, Edward P. Truhn, Cornell Aeronautical Laboratory

Second: *Blowing of Molten Alloy Melt*, Don W. Glasser, Westinghouse Research Laboratory

Third: *Cornu Spiral. When laminated glass lens breaks like this, perfect harmonic vibration occurs, no glass leaves either surface*, Edward W. Hettinger, Willson Products Co., Inc.

Honorable Mention: *Water Determination of Saponifiable Substances by Ether Extraction in Acid Solution*, Alfred Watson, Hall Laboratories, Inc.

PROFESSIONAL

First: *Heat Treating*, Robert A. Buchanan, U. S. Steel Corp. Research Laboratory

Second: *Fungus Colonies Growing on Plastic Film, Canal Zone*, Frankford Arsenal Studios, Fungus Section

Third: *Micro Flash of Poly Methyl Methacrylate Breaking in Izod Impact Test. Polarized Light. 2 Micro Seconds*, Sallie Aulabaugh, Monsanto Research Laboratory.

COLOR PRINTS

Non-Professional. No Awards

Professional. First: *Cooling Blow Pipe After Charge Has Been Collected*, Seth Stinson, Pittsburgh Plate Glass Co.

COLOR TRANSPARENCIES

First: *X50 to X300*, Exhibit of F. A. Hamm, General Aniline and Film Corp.

Second: Exhibit of H. W. Hughson, Chase Brass and Copper Co.

PHOTOMICROGRAPHS

BLACK AND WHITE

First: *Hastelloy B*, ×*1000. Series of four pictures, same subject, taken by white light and by polarized light at various angles*, R. T. Knaggs, General Electric Co.

Second: *1.10 Carbon Steel, Spheroidized, Normalized and Martensite.* ×*2000* Floyd J. Borgstedt, Consultant to Patzig Testing Labs.

Third: *Spot Welded Yellow Brass Sheet. Original*—×*10, Enlarged*—×*3*, Harold W. Hughson, Chase Brass and Copper Co.

Honorable Mention: *Exhibit of various vectographs and stereographs*, Alexander Gobus, Sam Tour & Co., Inc.

ELECTRON MICROSCOPE

First: *Replica of Quenched, Tempered and Etched Steel, Showing Tempered Martensite* ×*32,000*, Evelyn Gagnon, American Cyanamid Co.

Second: *Series of 14 related collodion replicas prepared by shadow casting technique.* ×*5000*, Helmut Thielsch, Allis-Chalmers Mfg. Co.

Third: *Zinc Oxide Smoke.* ×*20,000*, Jos. Rich, Monsanto Chemical Co.

RADIOGRAPHS. Non-Competitive

SEMI-MICRO

First: *Growth of Trichoderma Sp. on Protein-bonded Cork Gasket*, ×7, A. P. Alexander, Frankford Arsenal

Second: *Boroscope Pictures of Interior of a Machine Gun Barrel at Various Stages of its Life, Approx.* ×*1.4*, Stanley Pennypacker, Frankford Arsenal

Third: *Etched Melted Electrolytic Tin Plate Surface, X2, Unusual Structure*, D. H. Rowland, Carnegie-Illinois Steel Co.

Honorable Mention: *Partially Extruded Billet of Free Cutting Brass, Showing (1) Metal Flow, (2) Grain Refinement, (3) Origin of Extrusion Defect*, Harold W. Hughson, Chase Brass and Copper Co.

A number of black and white prints will be used in the ASTM Bulletin from time to time, several appearing in this issue.

T. L. Mayer, Acting Chairman of the Buffalo Committee on Arrangements, cooperated particularly closely with the committee, his office receiving the prints, providing facilities for judging and handling and returning them to the entrants.

American Society for Quality Control Founded

On February 16 at a meeting in New York City there was established a national society for men interested in industrial quality control. During the war years when the use of quality control methods in industry spread to many companies, large and small, a number of local Quality Control Societies were organized to exchange information and sponsor educational activities. The meeting of February 16 came as a result of over a year of preliminary planning and included representatives of 17 such local societies from all sections of the United States. A constitution was unanimously adopted establishing the "American Society for Quality Control," and the following officers were elected:

President: George D. Edwards, Director of Quality Assurance, Bell Telephone Laboratories, Inc.

Vice-President: Andrew I. Peterson, Manager of Quality Control, Radio Corporation of America, Victor Division.

Executive Secretary: Ralph E. Wareham, Manager New Products Division, National Photocolor Corp.

Treasurer: Alfred L. Davis, Rochester Institute of Technology.

The purpose of the Society will be the advancement and diffusion of knowledge of the science of quality control and its application to industrial progress. A magazine, *Industrial Quality Control*, originally published by the Buffalo society, will be issued bi-monthly with Prof. Martin A. Brumbaugh, University of Buffalo, as Chairman of the Editorial Board.

The science of quality control has as its object the maintenance of satisfactory quality in manufactured product at minimum cost. By establishing systematic sampling inspection procedures and simple routine methods for the analysis of inspection results, quality control locates the point in the production process at which defective material originates and directs attention to correction of the trouble. Thus it aims at the prevention of unsatisfactory material rather than the laborious separation of bad product from good at the end of a production line. During the war millions of dollars were saved both by industry and government through the reduction of scrap, improvement of quality, and lowering of inspection costs resulting from the efforts of quality control engineers.

Indicative of the organizational activities of quality control engineers is the Midwest Region Conference held March 5 and 6 in the LaSalle Hotel, Chicago. Registrations totaled 700 and papers delivered discussed quality control from the viewpoint of top management, inspection engineers, shop foremen, and statisticians. Speakers included Messrs. M. Herbert Eisenhart, President, Bausch and Lomb Optical Co.; Fred J. Halton, Jr., Assistant to President, Deere & Co.; and George D. Edwards, Director of Quality Assurance, Bell Telephone Laboratories. Similar meetings on a smaller scale are being sponsored periodically by other local groups. The Rochester Society held its second annual Quality Control Clinic on February 19, at which quality control engineers from a number of local societies participated. The Michigan Society held a series of similar forums on June 7 at the Book-Cadillac in Detroit. At each of these forums round-table discussions were held on a number of technical subjects in addition to formal addresses on subjects of more general interest.

For news of A.S.T.M. Committee E-11 on Quality Control, see p. 71.

Surface-Conversion Coatings

(A Correction)

In the December, 1945, issue of the ASTM Bulletin appeared an article by George Jernstedt under this title. Through an oversight, part of the author's acknowledgment for source material was omitted. The text of most of the section headed "Aluminum and Magnesium," beginning on page 30, was quoted from the papers by Edwards, and Edwards and Keller, referred to in the footnote on page 30. There are, however, several interpolations by Mr. Jernstedt which should not be attributed to these authors. This applies particularly to some of the statements regarding corrosion resistance of coatings on aluminum in standard salt spray which represent Mr. Jernstedt's own statements and not those of the authors quoted.

Note by Mr. Jernstedt.—The author is indeed pleased to see the record set straight with reference to the use of material from papers by Edwards, and Edwards and Keller for it was intended that full acknowledgment be given in the article.

Discussion of 1946 Annual Meeting Papers

Each year a very considerable portion of discussion of papers and reports that is included in our *Proceedings* reaches us in the form of *written* discussion submitted after the Annual Meeting. As usual, written discussion of reports and papers presented at the 1946 Annual Meeting in Buffalo, N. Y., will be received by the Committee on Papers and Publications until October 1. However, all who plan to submit discussion are urged to send it to Society Headquarters as far in advance of this date as possible in order to facilitate preparation of material for the *Proceedings*.

A.S.T.M. Representatives at University Exercises

Through the cooperation of two members of the Society, A.S.T.M. was represented at the Sesquicentennial Celebration of the University of North Carolina and the Inauguration of President-elect James Lewis Morrill of the University of Minnesota. Invitations had been received from the universities and we are pleased to announce the appointment and subsequent attendance at the respective ceremonies of the following: Wm. B. Hodge, Vice-President and Research Director, Parks-Cramer Co., Charlotte, N. C., at the North Carolina convocation; and H. G. Burnham, Engineer of Tests, Northern Pacific Railway Co., St. Paul, Minn., at the Minnesota exercises.

ASTM Bulletin

AUGUST 1946

NO. 141

NINETEEN-SIXTEEN
RACE STREET
PHILADELPHIA 3, PENNA.

About A Cogent Article Members Should Read

IN RECENT years we have been hearing with increasing frequency discussions of the legality of standardization in the light of the antitrust laws and interpretation of such laws by the Federal Trade Commission and by the Courts. These discussions have centered more particularly around standardization activities of trade associations. The importance of this subject to the bodies that make up the membership of the American Standards Association engendered the desire to have an authoritative presentation of the subject for the information and guidance of the staff executives of such bodies. The address by Mr. James V. Hayes, published on page 19 of this BULLETIN, resulted.

This cogent discussion is commended to our members for careful reading. It will be apparent that the testing of the legality of standardization has related primarily to standardization activities of bodies charged with conspiracy in restraint of trade in some form. After analyzing the latest cases and discussing their significance, Mr. Hayes concludes that standardization activity is legitimate in the absence of agreement by participants to limit their production to standard items; but that if an association or other group is prosecuted or complained against for conspiracy to restrain trade, it is almost certain that the standardization activity of such group will be cited as evidence of conspiracy. He expressed the further thought that it is highly improbable that an association or other group will ever be prosecuted or complained against for a standardization program *per se* in the absence of restraint of trade.

Of particular significance to our Society is the opinion offered by Mr. Hayes that standards developed by consultation of all parties at interest—as is true in the case of A.S.T.M. standards because of consultation with producers and consumers of materials and with general interests including governmental agencies in the development of such standards—enjoy a greater protection, so to speak, with respect to the application of antitrust laws than if the standard is developed by a private association in which the interests of only one group are represented. Our members and committees are asked particularly to note this opinion, in view of questions that have been raised occasionally about our standardization work in relation to the antitrust laws. It seems clear that standards arrived at by A.S.T.M. procedure and which, as we all know, are purely voluntary as to their acceptance by and use in industry, do not come within the ban of the antitrust laws.

Of course, the development or promulgation of standards by A.S.T.M. does not preclude any member or nonmember from making his own determination as to whether he will adhere to such standards; and the Society does no policing whatever.

Continuing Progress on Headquarters Building

AS NOTED briefly in the May issue of the BULLETIN the Society moved its offices to its new headquarters on May 27, occupying about two-thirds of the building which by that time had been sufficiently completed. Since that time substantial progress has been made in finishing the rest of the building, particularly the front portions which include the main entrance and lobby, Members' Room, Board and Committee Rooms and Secretary's office. From present indications this work will be substantially completed by October except for the installation of air conditioning equipment and some few minor items which are still not available.

It had at one time been planned to have a formal opening of the building and "housewarming" this fall. However, advantage will be taken of the fact that the Society's 1947 Spring Meeting and Committee Week will be held in Philadelphia during the week of February 24, thus giving opportunity for many members of the Society to participate in this event and to visit the new headquarters. Announcement of the plans will be made in due time through the BULLETIN.

In its report to the Society presented at the Annual Meeting in June the Executive Committee reported that due to the sharp increase in building costs since the work of rebuilding and alteration was begun the total cost will exceed by possibly as much as $30,000 the total of the contributions by members of the Society to the Building Fund. As explained in that report, the Executive Committee, deciding that the building should be completed as planned, placed in the hands of the Finance Committee the problem of providing the needed additional funds. As a first step the Finance Committee will invite further contributions to the Building Fund on the part of members who have not contributed, and a special appeal to such members will be made in September. We believe that these members will welcome the opportunity of contributing to the Building Fund to such an extent that the Society may own the building free of debt or other encumbrance.

New Board of Directors Organized

AMENDMENT of the Society's Charter to provide for the creation of a Board of Directors in place of an Executive Committee as the governing body was made by appropriate action of the Courts of Pennsylvania on December 10, 1945, and under the provisions of Article XI of the Society's By-laws as amended in 1945, the establishment of a Board of Directors became effective at the close of the Annual Meeting.

Accordingly on June 28 the new Board of Directors was organized. It comprises the President, two Vice-Presidents, fifteen Directors, and the last three Past-Presidents, as follows:

President:

ARTHUR W. CARPENTER, Manager of Testing Labs., The B. F. Goodrich Co., Akron 11, Ohio.

Vice-Presidents:

T. A. BOYD, Head, Fuel Dept., Research Labs. Div., General Motors Corp., Detroit 2, Mich.

RICHARD L. TEMPLIN, Assistant Director of Research and Chief Engineer of Tests, Aluminum Co. of America, New Kensington, Pa.

Directors:

(Terms Expiring in 1947)

W. C. HANNA, Chief Chemist, California Portland Cement Co., Colton, Calif.

L. B. JONES, Engineer of Tests, Test Dept., The Pennsylvania Railroad Co., Altoona, Pa.

J. T. MACKENZIE, Chief Metallurgist, American Cast Iron Pipe Co., Birmingham, Ala.

J. G. MORROW, Metallurgical Engineer, The Steel Co. of Canada, Ltd., Hamilton, Ont., Canada.

SAM TOUR, President, Sam Tour and Co., Inc., New York 6, N. Y.

(Terms Expiring in 1948)

J. R. FREEMAN, JR., Technical Manager, The American Brass Co., Waterbury 88, Conn.

L. J. MARKWARDT, Assistant Director, U. S. Forest Products Laboratory, Madison 5, Wis.

C. H. ROSE, Chemist, National Lead Co., Research Labs., Brooklyn 1, N. Y.

L. P. SPALDING, Chief Research Engineer, North American Aviation, Inc., Inglewood, Calif.

W. A. Zinzow, Chief Physicist, Bakelite Corp., Bound Brook, N. J.

(Terms Expiring in 1949)

A. G. ASHCROFT, Director of Research, Alexander Smith and Sons Carpet Co., Yonkers 1, N. Y.

A. T. CHAMEROY, Manager, Merchandise Testing and Developmental Lab., Sears, Roebuck and Co., 925 S. Homan Ave., Chicago 7, Ill.

J. H. FOOTE, Supervising Engineer, The Commonwealth & Southern Corp., 212 W. Michigan Ave., Jackson, Mich.

F. E. RICHART, Research Professor of Engineering Materials, University of Illinois, Urbana, Ill.

L. H. WINKLER, Metallurgical Engineer, Bethlehem Steel Co., Inc., Bethlehem, Pa.

Past-Presidents:

DEAN HARVEY, Consultant on Materials, 1170 South Ave., Pittsburgh 21, Pa. (Term Expiring in 1947)

P. H. BATES (retired), 3835 Livingston St., N. W., Washington 15, D. C. (Term Expiring in 1948)

JOHN R. TOWNSEND, Materials Engineer, Bell Telephone Laboratories, Inc., 463 West St., New York 14, N. Y. (Term Expiring in 1949)

At the organization meeting the Board of Directors adopted rules of procedure to govern its activities which will be published in the 1946 Year Book. These include regulations governing the finances of the Society which are substantially the same as heretofore.

Also in accordance with the new provisions of the By-laws the Board of Directors appointed an Executive Committee of six members to which certain responsibilities and authorities have been delegated in the administration of Society affairs. Six other committees of the Board were also appointed. The membership of these committees is as follows:

Executive Committee
T. A. Boyd, *Chairman*
A. W. Carpenter C. H. Rose
L. B. Jones J. R. Townsend
L. H. Winkler

Finance Committee
Dean Harvey, *Chairman*
P. H. Bates J. R. Freeman, Jr.
T. A. Boyd J. R. Townsend

Membership
W. C. Hanna, *Chairman*
A. G. Ashcroft F. E. Richart
L. J. Markwardt C. H. Rose

Meetings and Program
W. A. Zinzow, *Chairman*
A. T. Chameroy J. G. Morrow
J. H. Foote L. P. Spalding

Technical Committee Activities
R. L. Templin, *Chairman*
A. G. Ashcroft L. J. Markwardt
L. B. Jones F. E. Richart

Inter-Society Relations
J. H. Foote, *Chairman*
J. T. MacKenzie L. H. Winkler
Sam Tour W. A. Zinzow

Developmental Activities
Sam Tour, *Chairman*
A. T. Chameroy J. G. Morrow
J. T. MacKenzie L. P. Spalding

Numerous Actions on Standards Submitted to Members for Letter Vote

BY ACTION of the Forty-ninth Annual Meeting, 184 recommendations from standing committees were approved for submission to letter ballot of the Society membership. These recommendations cover tentative specifications and methods of test proposed for adoption as standard and the adoption as standard of 139 revisions in existing standards.

In connection with this detail of standardization procedure, it should be noted that only by letter ballot of the entire Society membership can changes be made in the formal standards. The action of an annual meeting session alone, or in the interval between annual meetings the Administrative Committee on Standards, can approve for publication as *tentative* proposed new standards, can approve *revisions in tentative standards* (which are incorporated immediately), or can take action to permit publication as *tentative* of *proposed revisions in standards*. Many such actions, of course, are taken at the Annual Meeting and throughout the year by the Administrative Committee on Standards.

A complete list of the items to be voted upon appears in the letter ballot being sent in a separate mailing to the members. Detailed information concerning most matters referred to letter ballot is given in the committee reports issued in preprint form to the membership in advance of the meeting. The *Summary of Proceedings* accompanying the letter ballot contains a record of all actions taken at the Annual Meeting.

The ballot will be canvassed in September at which time all items receiving a favorable vote become effective.

All new and revised standards and tentative standards on which action was taken during 1946 will be published in the 1946 Book of Standards. Meanwhile, many of the items will appear in various special compilations of standards relating to specific industries.

1947 Spring and Annual Meetings in Philadelphia and Atlantic City

THE Board of Directors has accepted an invitation from the Philadelphia District to hold 1947 Committee Week and the Spring Meeting in Philadelphia, probably during the week of February 24. Also all the members will be much interested to know that reservations have been made to have the 50th Annual Meeting of the Society at Chalfonte-Haddon Hall in Atlantic City during the week beginning Monday, June 16th. This hotel is being turned back to its owners by the Army which has been using it as a base hospital, ad thus the Society is enabled to return to a location where some of the most interesting Annual Meetings have been held. There will be further details about both of these meetings.

The technical feature of the Spring Meeting in Philadelphia is expected to be a Symposium on Evaluation of Paints and Paint Materials. This will be arranged by the Subcommittee on Papers of Committee D-1 on Paint, Varnish, Lacquer, and Related Products with the Philadelphia District represented and cooperating. Dr. W. T. Pearce, the D-1 Chairman, has been designated as the district representative on the committee.

Throughout Committee Week beginning February 24 there will be in progress the usual large number of meetings of technical committees.

Any members who wish to write for hotel reservations can now do so! In Atlantic City address Chalfonte-Haddon Hall, in Philadelphia address the Benjamin Franklin Hotel. The use of twin-bedded rooms, instead of singles, will probably again be stressed.

James H. Wolfe, Jr., A.S.T.M. Office Manager

EFFECTIVE ON May 27, 1946, James H. Wolfe, Jr., who for a period of about three years had been serving as Standards Assistant in the Standards Department became Office Manager at A.S.T.M. Headquarters. This appointment is in line with plans gradually being put into effect for the reorganization and expansion of the Staff as developed by the Study Committee and approved by the Board of Directors. A native Philadelphian, Mr. Wolfe attended the University of Pennsylvania, graduating from the Towne Scientific School in Civil Engineering in 1919. His activities since that time have been largely concentrated in the field of building construction and design. He was, for some 12 years, on the staff of the Turner Construction Co., where he was engaged in a wide variety of industrial and institutional building construction, chiefly in the Philadelphia area. For a time he was located in Turner Construction Co.'s New York office. Previous to his affiliation with Turner, he was associated with various Philadelphia contractors.

This experience has served the Society in good stead, for he has, for several months, been assisting the Executive Secretary and the Headquarters Building Committee in connection with the large number of problems incident to the remodeling and furnishing of the Headquarters building.

His responsibilities as Office Manager will involve those normally associated with office management, but also will include completion of the building and its operation.

Temperature Coefficients for Proving Rings

TESTING machines for applying forces to engineering materials and structures are usually calibrated by means of elastic calibration devices. The most widely used device is the proving ring, in which the deflection of the loaded diameter is measured by means of a micrometer screw and vibrating reed. Rings are not compensated for change in elastic properties and dimensions with temperature. Therefore, the use of a temperature coefficient is required in computing the ring load for deflections obtained at temperatures which differ from the temperature of calibration.

In a paper appearing in the *Journal of Research* for July (RP1726), Bruce Wilson, Douglas R. Tate, and George Borkowski report the temperature coefficients of 14 representative proving rings. All of the rings tested were made of steels believed to have had a total alloying content not exceeding 5 per cent. The temperature coefficients of rings made of steels having a greater total alloying content may be expected to differ significantly from the values reported. These rings were calibrated by dead weights at temperatures of 70 F. and 100 F. Values of the temperature coefficient, computed for each of the rings, varied from −0.000123 to −0.000160 per degree F., the average value being −0.000148. The temperature coefficient of one proving ring for the range +70 to −93 F. was determined from measurements of its natural frequencies at these temperatures. It was found to be −0.00023 per degree F. for this temperature range.

The temperature coefficient of a proving ring is shown to be equal to the temperature coefficient of Young's modulus of elasticity of the ring material, plus twice the coefficient of thermal expansion.—Reprinted from the *Technical News Bulletin*, National Bureau of Standards, No. 351, July, 1946.

Schedule of A.S.T.M. Meetings

DATE	COMMITTEE	PLACE
September 18, 19	D-5 on Coal and Coke	Washington, D. C.
October 7, 8	Board of Directors	Headquarters, Philadelphia, Pa.
Week of October 14	D-14 on Adhesives	Atlantic City, N. J.
Week of October 14	D-20 on Plastics	Atlantic City, N. J.
October 16, 17	D-9 on Electrical Insulating Materials	Atlantic City, N. J.
October 17	Administrative Committee on Research	Headquarters, Philadelphia, Pa.
October 18	Administrative Committee on Simulated Service Testing	Headquarters, Philadelphia, Pa.
October 29	Southern California District	Los Angeles, Calif.

Recent Actions by Standards Committee

From the accompanying table it will be noted that the Administrative Committee on Standards has approved the recommendations of several technical committees concerning various specifications and tests. These actions became effective on the date shown in the table. While the new and revised items will be published in the 1946 Book of Standards, or the new Volume on the Chemical Analysis of Metals, and thus the members will receive them in their latest form, some comments on a few of the items may now be of interest.

Committee D-20 on Plastics for some time has been considering various definitions of terms which are of such importance in this field, as in other materials activities, and while there were some differences of opinion with respect to what was proposed on what is a "plastic" agreement has now been reached on the following definition of the noun, "plastic."

> "A plastic is any one of a large and varied group of materials which consists of, or contains as an essential ingredient, an organic substance of large molecular weight; and which, while solid in the finished state, at some stage in its manufacture has been or can be formed (cast, calendered, extruded, molded, etc.) into various shapes by flow—usually through the application singly or together of heat and pressure."

In commenting on the definition and some of the differences of opinion, one of the members of the Administrative Committee on Standards pointed out that only within the last few years has the noun "plastic" come into general use. While plastic materials have been known for centuries, only recently have they been called "plastics." This period was simultaneous with the development of the modern, scientific organic material. He concludes that historically and on the basis of use, the proposed definition seems justified.

The revisions in the five specifications for electric-resistance-welded tubes were under consideration in Committee A-1 on Steel for many months and in general they will provide a more rigorous testing and inspection of this material, which was so widely used during the war period. Production facilities for this material were augmented tremendously with the construction of new plants and the subcommittee in charge, in drafting the revisions, considered some of the problems which had arisen because of the large number of new companies which were furnishing this type of material. Subsequent to the action on these revisions, the Steel Committee has recommended editorial changes in the specification for Atomic-Hydrogen Arc-Welded and Electric-Resistance-Welded Alloy-Steel Boiler and Superheater Tubes (A 249–44) to indicate that other processes, not necessarily described by the title, can be used to produce tubes which meet the requirements.

These specifications will be published in separate pamphlet form to include the various revisions and it is expected Committee A-1 will consider them next year for adoption.

The revised Methods of Chemical Analysis of Solder Metal (E 46) will include a procedure for determining zinc by the polarographic method.

New Tentatives

Tentative Definition of the Noun Plastic (D 883 – 46 T) (July 10)

Method of Sampling Slab Zinc (E 65 – 46 T) (July 10)

Emergency to Tentative Status

The following specifications for heavy forgings were reverted from emergency to tentative status (July 10):

- ES-21 Emergency Spec. for Carbon-Steel and Alloy-Steel Forgings for Magnetic Retaining Rings for Turbine Generators (A 288 – 46 T)
- ES-22 Emergency Spec. for Alloy-Steel Forgings for Nonmagnetic Coil Retaining Ring for Turbine Generators (A 289 – 46 T)
- ES-23a Emergency Spec. for Carbon-Steel Forgings for Rings for Main Reduction Gears (A 290 – 46 T)
- ES-24 Emergency Spec. for Carbon-Steel and Alloy-Steel Forgings for Pinions for Main Reduction Gears (A 291 – 46 T)
- ES-25 Emergency Spec. for Carbon-Steel and Alloy-Steel Forgings for Turbine Generator Rotors and Shafts (A 292 – 46 T)
- ES-26 Emergency Spec. for Carbon-Steel and Alloy-Steel Forgings for Turbine Rotors and Shafts (A 293 – 46 T)
- ES-27 Emergency Spec. for Carbon-Steel and Alloy-Steel Forgings for Turbine Bucket Wheels (A 294 – 46 T)

Tentative Revisions of Standards

Tentative Revisions of Standard Specifications for (July 22):

Electric-Resistance-Welded and Open-Hearth Iron Boiler Tubes (A 178 – 44)

Electric-Resistance-Welded Steel Heat-Exchanger and Condenser Tubes (A 214 – 44)

Electric-Resistance-Welded Steel Boiler and Superheater Tubes for High-Pressure Service (A 226 – 44)

Atomic - Hydrogen - Arc - Welded and and Electric-Resistance-Welded Alloy-Steel Boiler and Superheater Tubes (A 249 – 44) and

Electric-Resistance-Welded Carbon-Molybdenum Alloy-Steel Boiler and Superheater Tubes (A 250 – 44)

Revisions of Tentative Standards

Revisions in Tentative Specification for Iron and Steel Gas Welding Rods (A 251 – 46 T) (July 26)

Revision of Tentative Methods of Chemical Analysis of Lead- and Tin-Base Solder Metal to include a procedure for the determination of zinc by the polarographic method (E 46 – 46 T) (July 10)

Withdrawals

Withdrawal of the following emergency alternates (July 10):

EA-A 53	EA-A 192	EA-A 21
EA-A 120	EA-A 209	EA-A 235
EA-A 134	EA-A 211	EA-A 236
EA-A 135	EA-A 268	EA-A 237
EA-A 139	EA-A 269	EA-A 238
EA-A 161	EA-A 270	EA-A 274
	EA-A 271	

Technical Committee A Receives Navy Award

The U. S. Navy Department has awarded to Technical Committee A on Automotive Rubber which functions as a part of Committee D-11 on Rubber Products the Navy Ordnance Development Award, and each member of the committee has been given an emblem signifying the award. This committee carried out a number of emergency assignments which were of help to the Navy Department.

Technical Committee A functions under the joint sponsorship of A.S.T.M. and the Society of Automotive Engineers.

Other A.S.T.M. committees have received letters of commendation and other marks of appreciation from various service branches of the Government, and the Society received the Army Ordnance Award and the Navy Award of Achievement.

Heavy Publication Schedule for 1946–1947

Includes Book of Standards, Chemical Analysis of Metals, Special Compilations, Numerous Symposiums and Other Material

WITH THE appearance this year of the complete Book of A.S.T.M. Standards the group of regular publications, including the enlarged 1946 *Proceedings*, Year Book, Index to Standards, Spring Meeting Symposiums, and the ever enlarging group of compilations of standards, already constitutes a heavy publication schedule. In addition, this year's schedule will include the 1946 Book of A.S.T.M. Methods of Chemical Analysis of Metals, the five-year Index of Committee Reports and Technical Papers, the Index to the Literature on Spectrochemical Analysis 1940–1945, and a group of special symposiums which featured the Forty-Ninth Annual Meeting.

The total number of pages involved in these various books and pamphlets will be over 15,000. The Book of Standards itself will aggregate approximately 7000 pages.

Later in the year, there will be transmitted to each member a special members' order blank which will list all the publications available and list the special prices to members.

Regular Publications

1946 Book of Standards

Following the practice of bringing out the complete Book of Standards every two years, 1946 becomes a "Book of Standards" year. The 1946 book estimated to total close to 7000 pages, has now reached a point when it is no longer practical to be published as three books. It will, therefore, be necessary in 1946 to bring the Standards out in five books. This will be accomplished by splitting Part I, Metals; and Part III, Nonmetallic Materials—General; into four books. The five books of the 1946 Standards are, therefore, being labeled, Part I—A, Ferrous Metals; Part I—B, Non-Ferrous Metals; Part II—Nonmetallic Materials—Constructional; Part III—A, Nonmetallic—General; Part III—B, Nonmetallic—General. The present plan is to split Part I into two books, one covering the ferrous and the other non-ferrous materials, each book containing both the standards and tentatives relating to any given field. Consideration is still being given to the best method of splitting the standards in Part III. In any event, all members who have requested either Part I or Part III on their dues will get both sections of the parts requested. Every effort is being made to have all parts of the Book of Standards in the mail shortly after the end of the year.

Methods of Chemical Analysis

In addition to the standards and tentatives included in the 1946 Book of Standards, those methods pertaining to Chemical Analysis of Metals will be published in a separate volume as the 1946 Book of A.S.T.M. Methods of Chemical Analysis of Metals. The previous book of chemical methods was published in 1943. The 1946 Book of Chemical Analysis is now coming off press and will be distributed shortly to all those who have requested it. The book comprises 412 pages.

1946 Proceedings

Following the practice established last year, the 1946 *Proceedings* will contain in addition to Committee Reports and technical papers presented at the 1946 Annual Meeting, certain papers that may have been printed during the year in the ASTM Bulletin. Some of the papers presented at the Annual Meeting will appear as special symposium publications. It is estimated that the 1946 *Proceedings* will comprise 1400 pages.

1946 Index to A.S.T.M. Standards

This index continues to increase in value as the number of specifications becomes larger and again gives the latest complete reference to publications where the various specifications and test methods appear. The index should be particularly helpful this year in view of the appearance of the 1946 Book of Standards in five separate volumes. Publication of the new edition is scheduled for February, 1947, and will probably aggregate 240 pages.

1946 Year Book

The Year Book contains a list of the complete membership of the Society (name, title, address, company, etc.), arranged alphabetically and also geographically, also the personnel of all A.S.T.M. committees, and other pertinent information. It is furnished only to members on request, for use in connection with activities of the Society. Publication date of this 490-page book—about November 1.

Five-Year Index to Committee Reports and Technical Papers

The Index to Committee Reports and Technical Papers published by the Society over the years 1941–1945 is now in preparation and will include references to all reports and papers published by the Society in the *Proceedings*, ASTM Bulletin, and special publications. It is expected that the index will comprise 200 pages. Every effort is being made to have it ready for distribution early in 1947.

Special Compilations of Standards

The tabulation given below of special compilations of standards, several of which include supplementary material relating to the fields covered, should be viewed as an approximate schedule. There are so many factors affecting these books that it is not possible to give any accurate estimation of size or the date that they may become available. The size is affected by committee recommendations which may be coming through the Standards Committee and the date of issue is governed somewhat by editorial considerations, but to a

Committee Sponsoring	Title	Approximate Number Pages	Approximate Publication Date
A-1	Pipe and Piping Materials	320	Oct.-Nov.
B-8	Electrodeposited Metallic Coatings	60	Sept.-Oct.
C-1	Cementitious, Ceramic, Concrete and Masonry Materials	200	Sept.-Oct.
C-8	Refractories	230	Feb.-Mar.
C-9	Concrete and Concrete Aggregates	200	Jan.-Feb.
C-9, D-4	Mineral Aggregates	130	Feb.-Mar.
C-14	Glass and Glass Products	100	Sept.-Oct.
D-2	Petroleum Products and Lubricants	600	Oct.-Nov.
D-5	Coal and Coke	170	Jan.-Feb.
D-6	Paper and Paper Products	224	Sept.-Oct.
D-9	Electrical Insulating Materials	600	Jan.-Feb.
D-11	Rubber and Rubber-Like Materials	575	Feb.-Mar.
D-12	Soaps and Other Detergents	170	Feb.-Mar.
D-13	Textile Materials	532	Sept.-Oct.
D-20	Plastics	590	Oct.-Nov.

great extent by the tremendous load our printers are carrying.

Included in the tabulation are two new compilations covering the Standards under the jurisdiction of Committee B-8 on Electrodeposited Metallic Coatings and those under the jurisdiction of Committee C-14 on Glass and Glass Products.

Special Technical Publications, Symposiums, etc.

1946 Spring Meeting Papers

Symposium on Atmospheric Exposure Tests on Non-Ferrous Metals

This Symposium will comprise six papers presented at the afternoon and evening sessions of the Spring Meeting on February 27, 1946. These papers together with the discussion will be published as a separate symposium volume comprising approximately 75 pages and should be available for distribution in the fall.

Symposium on Statistical Quality Control

This Symposium was held on Tuesday evening, February 26, during the 1946 Spring Meeting and comprised papers by Colonel Leslie E. Simon on "Dollars for Your Thoughts" and Messrs. Casper Goffman and Joseph Manuele on "Statistical Quality Control in Its Application to Specification Requirements." Both of these papers appeared in the March ASTM Bulletin. The papers together with their discussion should aggregate 12 pages and will appear in the Bulletin size page, approximately 8½ by 11 in.

1946 Annual Meeting Symposiums

The 1946 Annual Meeting was featured by nine symposiums. It is planned to publish all nine of these Symposiums, including discussion, in separate pamphlet form and in addition to include some of them in the 1946 *Proceedings*. In addition to the papers, many of which were preprinted in advance of the meeting, there will be included the various discussions presented at the meeting. The Symposiums are listed below:

Symposium on Bearings.—Five technical papers; estimated size, 72 pages; published as separate pamphlet only.

Symposium on Spectroscopic Light Sources.—Four technical papers; estimated size, 120 pages; published as separate pamphlet only.

Symposium on Oil Procurement Practices.—Seven technical papers; estimated size, 64 pages; published as separate pamphlet only.

Symposium on Testing of Parts and Assemblies.—Six technical papers; estimated size, 96 pages; published as separate pamphlet only.

Symposium on Gas Turbine Materials.—Eight technical papers; estimated size, 100 pages; published as separate pamphlet only.

Symposium on pH Measurements.—Seven technical papers; estimated size, 116 pages; published as separate pamphlet.

Symposium on Fatigue.—Eight technical papers; estimated size, 170 pages; published as separate reprint from 1946 A.S.T.M. *Proceedings.*

Symposium on Atmospheric Weathering of Corrosion-Resistant Steels.—Seven technical papers; estimated size, 96 pages; published as separate reprint from 1946 A.S.T.M. *Proceedings.*

Symposium on Freezing-and-Thawing Tests of Concrete.—Estimated 48 pages; published as separate reprint from 1946 A.S.T.M. *Proceedings.*

Special Publications

Discussion of a Fundamental Theory of Adhesion:

This discussion was presented as a very interesting lecture by Dr. W. A. Weyl of Pennsylvania State College and was presented in the meeting of A.S.T.M. Committee D-14 on Adhesives during the Annual Meeting of the Society. It is planned to make this paper with discussion available in separate pamphlet form and copies should be ready for distribution during the fall.

Symposium on Effect of Low Temperature on Materials:

This Symposium, to aggregate some 100 pages, comprises the five technical papers and the discussion presented at the meeting sponsored by the Philadelphia District Committee on Tuesday, March 19, 1946, in Philadelphia. Final manuscripts of the very interesting papers presented at this meeting are now being completed by the authors and should all be in our hands early in September. It is hoped that this Symposium can be made available for distribution late in the fall.

Symposium on Ultra High-Voltage Radiography:

This Symposium was sponsored jointly by A.S.T.M. Committee

List of Pending Publications
(More Details in Accompanying Article)

Regular Publications
- 1946 Book of Standards
- Methods of Chemical Analysis of Metals
- 1946 Proceedings
- 1946 Index to A.S.T.M. Standards
- 1946 Year Book

Special Compilations
- Steel Pipe
- Electrodeposited Coatings
- Cementitious and Masonry Materials
- Refractories
- Concrete and Concrete Aggregates
- Mineral Aggregates
- Glass and Glass Products
- Petroleum Products
- Coal and Coke
- Paper and Paper Products
- Electrical Insulating Materials
- Rubber
- Soaps
- Textiles
- Plastics

Technical Publications and Papers[1]
- Five-Year Index to Reports and Papers
- Discussion of a Fundamental Theory of Adhesion
- 1946 Marburg Lecture
- Index on Spectrochemical Analysis

Symposiums[1]
- Exposure Tests on Non-Ferrous Metals
- Statistical Quality Control
- Bearings
- Spectroscopic Light Sources
- Oil Procurement Practices
- Testing of Parts and Assemblies
- Gas Turbine Material
- pH Measurements
- Fatigue
- Weathering of Corrosion-Resistant Steels
- Freezing-and-Thawing Tests of Concrete
- Effect of Low Temperature on Materials
- Ultra High-Voltage Radiography

[1] Some of these items will appear in the 1946 *Proceedings.*

E-7 on Radiography and the American Industrial Radium and X-ray Society and held on February 8, 1946, during the Metals Congress in Cleveland, Ohio. The Symposium comprises eight technical papers and discussion which should be of interest to everyone using radiographic methods of testing. Final manuscripts are being prepared by the authors. Naturally, the appearance of the Symposium is dependent on the receipt of manuscripts but it is hoped that the book can be made available this year. It is estimated that this Symposium will comprise approximately 150 pages.

1946 Marburg Lecture:

A very interesting Marburg Lecture was presented at the 1946 Annual Meeting by Dr. J. J. Mattiello on the subject "Protective Organic Coatings as Engineering Materials." Dr. Mattiello covered the development of protective organic coatings and the physical and chemical properties of the raw materials. Many of the recent developments during World War II were pointed out. The lecture should indeed be of interest to everyone concerned with protective coatings. Prior to its publication in the 1946 *Proceedings*, the lecture will be available in reprint form and should be available around the middle of November. It will aggregate about 90 pages.

Index to the Literature on Spectrochemical Analysis 1940–1945:

An index on spectrochemical analysis covering the years 1920–1937 was published in January, 1939, with a second printing covering the years 1920–1939 appearing in April, 1941. The present index will cover the years 1940–1945 and will also include bibliographies for each index listing. These very extensive indexes have been prepared by W. F. Meggers and B. F. Scribner and the publication sponsored by Committee E-2 on Spectrographic Analysis. The index, estimated to comprise some 200 pages, should be available early in the fall.

New England District Organized

At a meeting held in Boston at the Engineers Club on May 20, there was formally organized a New England District Committee. This new group was authorized as a result of preliminary discussions with leading members in New England, and the results of an extensive questionnaire sent to the some 600 members and committee members in the New England states.

Professor H. J. Ball, Lowell Textile Institute, and A.S.T.M. Past-President, opened the meeting as temporary district chairman. The meeting was preceded by a dinner and discussion period, at which election of the following officers took place:

Chairman: H. L. Sherman, Skinner & Sherman, Inc., Boston, Mass.
Vice-Chairman: V. J. Altieri, Eastern Gas and Fuel Associates, Everett, Mass.
Secretary: M. N. Clair, The Thompson & Lichtner Co., Inc., Brookline, Mass.

Personnel of the district committee as appointed by President Townsend includes the following:

Term One Year:
H. J. Ball, Lowell Textile Institute
A. V. Bratt, Boston Department of Public Works Laboratory
R. W. Chadbourn, Boston Edison Co.
H. L. Sherman, Skinner & Sherman, Inc.

Term Two Years:
J. J. Allen, Firestone Rubber and Latex Products
V. J. Altieri, Eastern Gas and Fuel Associates
E. N. Downing, General Electric Co.
C. G. Lutts, U. S. Navy Materials Laboratory

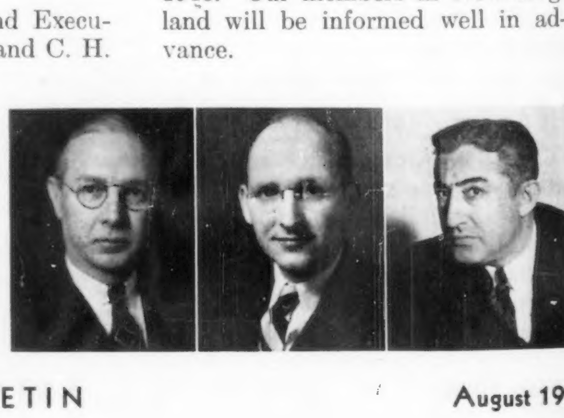
Term Three Years:
F. A. Barbour, Civil and Sanitary Engineer
M. N. Clair, The Thompson and Lichtner Co., Inc.
H. H. Lester, Research Division, Watertown Arsenal
W. C. Voss, Massachusetts Institute of Technology

President Townsend and Executive Secretary Warwick, and C. H. Fellows (Detroit), Chairman of the Administrative Committee on District Activities, attended the meeting, the latter outlining some of the Society's plans for stimulating district activity and referring to the new District Charter and Manual which are in the course of completion. He stressed the fact that districts can aid greatly in fostering various phases of the Society's work, and in particular making known to various industries and organizations in the respective localities what Society service can be, particularly with respect to its standardization and research programs.

Mr. Warwick in covering the subject "The A.S.T.M. of the Future" discussed some of the current activities of the Society, noting the new administrative setup and in particular some of the more recent technical developments involving simulated service testing, fatigue, the testing of parts and assemblies, and referred to some of the materials fields in which A.S.T.M. is extending its work. President Townsend in felicitating the District on its organization drew on his long experience as materials standards engineer and materials engineer for Bell Telephone Laboratories, and in particular his extensive European travels where he had the opportunity of checking on the American way of handling technical problems as compared with the German. He emphasized some of the information which he had recorded in technical papers published in the December, 1945, and May, 1946, issues of the ASTM Bulletin.

There were about 60 present at the dinner and discussion period.

The district committee plans to sponsor a meeting during the fall of 1946. Our members in New England will be informed well in advance.



New England District Officers.

From *l.* to *r.* H. L. Sherman, Chairman; M. N. Clair, Secretary; V. J. Altieri, Vice-Chairman.

District Officers and Personnel

THE District Committees of the Society have held election of officers for the ensuing term, and they have also recommended reappointments and new appointments for their district committee personnel, some of these appointments having been made by President J. R. Townsend prior to his retirement, and the others by new President Arthur W. Carpenter. A list of the officers of each district, and of the appointments, both new appointments and reappointments, is given below. The terms of approximately one-third of the district personnel expire each year.

Several of the District Committees are planning fall meetings and members are urged to be on the lookout for news of these in the ASTM BULLETIN. During the past year several of the affairs planned by the districts were outstanding and resulted in very interesting papers and publications. As soon as possible after the meeting arrangements are definite, each member or committee member in the respective area receives a direct-mail notice and usually other groups of technical men concerned with the subject under discussion are invited.

While the new district Charter being prepared by the Administrative Committee on District Activities will, when adopted, result in a number of modifications in the functioning of districts, they will continue on their present basis during 1946, and the current district committees will carry over under the new Charter.

Chicago

Officers: J. J. Kanter,* Chairman, Crane Co.; J. de N. Macomb, Vice-Chairman, Inland Steel Co.; G. E. Stryker,* Secretary, Bell & Howell Co.

* Indicates new appointment, or new election in case of officers.

Members: C. E. Ambelang, Public Service Co. of Northern Illinois; L. H. Amrine,* Imperial Molded Products Corp.; J. F. Calef, Automatic Electric Co.; A. T. Chameroy,* Sears Roebuck & Co.; D. L. Colwell, National Smelting and Refining Co.; J. T. Jarman,* Allis-Chalmers Mfg. Co.; J. de N. Macomb, Inland Steel Co.; H. G. Miller,* Chicago, Milwaukee, St. Paul & Pacific R.R. Co.; E. F. Pohlman,* The Peoples Gas Light and Coke Co.; Cyril Stanley Smith,* University of Chicago; W. A. Straw, Western Electric Co., Inc.; Paul Van Cleef, Van Cleef Brothers; E. R. Young, Climax Molybdenum Co.

Cleveland

Officers: A. J. Tuscany, Chairman, Metal Lath Manufacturers Assn.; E. G. Kimmich,* Vice-Chairman, The Goodyear Tire and Rubber Co.; R. T. Bayless, Secretary, American Society for Metals.

Appointments: H. D. Churchill, Case School of Applied Science; J. V. Emmons, The Cleveland Twist Drill Co.; H. H. Gorrie,* Bailey Meter Co.; K. H. Osborn, The Osborn Engineering Co.; J. M. Stadter,* The Glidden Co.; F. G. Steinebach, Penton Publishing Co.; R. B. Textor, the Textor Laboratories; A. J. Tuscany, Metal Lath Manufacturers Assn.

Detroit

Officers: V. M. Darsey,* Chairman, Parker Rust-Proof Co.; F. P. Zimmerli,* Vice-Chairman, Barnes-Gibson-Raymond Div., Associated Spring Corp.; C. E. Heussner,* Secretary, Chrysler Corp.

Appointments: T. A. Boyd, General Motors Corp.; V. M. Darsey, Parker Rust-Proof Co.; J. L. McCloud, Ford Motor Co.; W. P. Putnam, The Detroit Testing Laboratory.

New York

Officers: M. P. Davis, Chairman, Otis Elevator Co.; E. A. Snyder, Vice-Chairman, Socony-Vacuum Oil Co., Inc.; G. O. Hiers, Secretary, National Lead Co.

Appointments: R. B. Barnes, American Cyanamid Co.; W. H. Bassett, Jr. (In Army Service); J. G. Detwiler, The Texas Company; S. R. Doner,* Manhattan Rubber Mfg. Div., Raybestos-Manhattan, Inc.; Ephraim Freedman,* Macy's; L. H. Fry, The Steam Locomotive Research Institute; C. T. Hatcher,* Consolidated Edison Co. of New York, Inc.; P. S. Kingsley,* General Electric Co.; E. A. Snyder, Socony-Vacuum Oil Co., Inc.; T. Smith Taylor, United States Testing Co., Inc.; Gordon Thompson, Electrical Testing Labortories; R. M. Wilhelm, Miller & Weber.

Northern California

Officers: Dozier Finley, Chairman, The Paraffine Cos., Inc.; G. H. Raitt,* Vice-Chairman, Steel Tank & Pipe Co. of California; P. V. Garin, Secretary, Southern Pacific Co.

Appointments: R. E. Brosemer, General Electric Co.; R. E. Davis, University of California; T. P. Dresser, Jr., Abbot A. Hanks, Inc.; M. L. Hall,* The Baldwin Locomotive Works; E. S. Warner,* Standard Oil Co. of California.

Philadelphia

Officers: J. F. Vogdes, Jr.,* Chairman, Philadelphia Committee, Pennsylvania Economy League; A. O. Schaefer,* Vice-Chairman, The Midvale Co.; G. E. Landt,* Secretary, Philadelphia Textile Finishers, Inc.

Appointments: E. J. Albert, Thwing-Albert Instrument Co.; L. D. Betz, W. H. & L. D. Betz; W. J. Jeffries, Philadelphia Ordnance Dept., U. S. Army; Tinius Olsen, 2d, Tinius Olsen Testing Machine Co.; J. F. Vogdes, Jr., Philadelphia Committee, Pennsylvania Economy League.

Pittsburgh

Officers: J. J. Bowman,* Chairman, Aluminum Company of America; F. T. Mavis,* Vice-Chairman, Carnegie Institute of Technology; M. D. Baker,* Secretary, West Penn Power Co.

Appointments: H. A. Ambrose, Gulf Research and Development Co.; W. E. Caugherty,* Allegheny Ludlum Steel Corp.; A. R. Ellis, Pittsburgh Testing Lab.; C. F. Goodrich, American Bridge Co.; H. J. Kasch,* James B. Sipe & Co.; E. H. McClelland,* Carnegie Library; S. M. Phelps, Mellon Institute of Industrial Research.







Some new district Officers

Top *l.* to *r.* R. B. Stringfield, Chairman, Southern California; G. E. Landt, Secretary, Philadelphia; J. J. Bowman, Chairman, Pittsburgh. *l.* to *r.* Lower C. E. Emmons, Vice-Chairman, Southern California; A. O. Schaefer, Vice-Chairman, Philadelphia; G. H. Raitt, Vice-Chairman, Northern California; C. E. Heussner, Secretary, Detroit.

St. Louis

Officers: G. L. Oliensis,* Chairman, Lloyd A. Fry Roofing Co.; A. W. Brust,* Vice-Chairman, Washington University; S. B. Roberts,* Secretary, Robert W. Hunt Co.

Appointments: A. W. Brust,* Washington University; L. C. Hewitt, Laclede-Christy Clay Products Co.; L. A. Wagner, Missouri Portland Cement Co.; J. M. Wendling,* St. Louis Municipal Testing Labs.; F. G. White, Granite City Steel Co.

Southern California

Officers: R. B. Stringfield,* Chairman, Reeves Rubber Co., Inc.; C. E. Emmons,* Vice-Chairman, The Texas Company; H. W. Jewell, Secretary, Pacific Clay Products.

Appointments: F. J. Converse, California Institute of Technology; H. W. Jewell, Pacific Clay Products; E. L. Johnson,* Concrete Conduit Co.; H. E. Jung, Southern California Edison Co.; N. W. Kelch,* Research Engineer and Architect; J. B. Morey,* The International Nickel Co., Inc.; R. G. Osborne, Raymond G. Osborne Testing Labs.

New England District Committee
(newly organized in May)

For Personnel, see page 66.

Western New York-Ontario
(details in October BULLETIN)

A.S.T.M. Conference on Sandwich Type Materials

SANDWICH TYPE constructions of materials have opened up new and broad fields in the combinations of materials either of like or unlike characteristics. This composite construction received a strong impetus as a result of the war, for example in the aircraft industry, with the Mosquito Bomber an outstanding example of such a product. This or similar types are expected to extend to a great number of fields with possibilities in housing construction probably receiving the greatest emphasis at the present time.

The Society has recognized the fact that combinations of materials, from the viewpoint of setting up standard methods of tests and specifications on such combinations, completely cut across many of the committee lines of the Society. Certain combinations using like materials may well be within the scope of a certain technical committee, such as plywood combinations now being handled by Committee D-7 on Wood. Committees such as C-16 on Thermal Insulating Materials, E-5 on Fire Tests of Materials and Constructions, and E-6 on Methods of Testing Building Constructions also will be in a position to handle certain phases of development. The Administrative Committee on Simulated Service Testing will fit into the picture from the standpoint of end use or performance testing.

The Society officers decided that the most effective way to obtain a reasonably complete picture of the needs and the part that the Society should play in meeting them was to bring together a group of men who were thoroughly familiar with the problems, who knew the methods of producing both the constituent materials and the composite materials made from them and who have had some experience in the testing and specifying of these materials. This was to include representatives of all of the existing committees which would be vitally concerned with some phases of the problem. Accordingly, a conference was held on June 7 at the Hotel Warwick, Philadelphia, with Executive Secretary C. L. Warwick acting as chairman. A very representative attendance of both committees and the industry as a whole participated in a discussion of the subject.

For purposes of discussion and to make it clearly evident just what is meant by the term "sandwich" it is generally construed at this stage of consideration by the Society that the term is applied to those composite types of constructions composed of similar or dissimilar materials, metallic and nonmetallic, usually in a layered or laminated arrangement.

The discussion at the meeting brought forth a wealth of expressions and experiences based on the problems and the work accomplished individually in various industries and establishments. The principal part of the discussion centered around the need for fundamental basic tests on the individual materials making up the sandwich (some of these "sandwiches" may even approach the well-known "Dagwood" type as far as number of individual layers or complexity of materials composing them), and the need for end use or performance tests on the complete construction. Consensus of opinion recognized the need for some form of a committee acting possibly as a steering committee with working subcommittees to handle the projects which are beyond the scope of existing A.S.T.M. committees. It is likely that the Board of Directors will suggest the appointment of a small study group for further study and analysis.

Asbestos-Cement Products Now in the Family of Technical Committees

COMMITTEE C-17 on Asbestos-Cement Products became the latest addition to the technical committees within the Society with its organization at a meeting held in Washington, D. C., on June 6, 1946. A very representative group of the industry was present, as well as representatives of consumers such as the several Government agencies and the American Institute of Architects, together with general interests such as the National Bureau of Standards and Columbia University. The use of these products has become so extensive that the committee was authorized by the Executive Committee after numerous inquiries had been received and a canvass made to determine the desirability and need for such a committee.

The following statement of scope as approved by the committee covers its activities:

Scope: Formulation of test methods and specifications relating to roofing and siding, flat sheets, corrugated sheets, pipe and similar products deriving their essential properties from asbestos and cement.

The initial membership of the committee is indicated below:

American Institute of Architects, Theodore I. Coe

Asbestos-Cement Products Assn., Donald Tulloch, Jr.
Austin Co., Albert S. Low
Carey Mfg. Co., The Philip, H. W. Greider
City of Detroit, Dept. of Bldgs. and Safety Eng., C. A. Daymude
Columbia University, Civil Engineering Research Labs., W. J. Krefeld, Associate Prof. & Director, Eng. Materials Lab.
Flintkote Co., The, H. S. Jobbins
Johns-Manville Corp., D. T. Colton. Subcomm. only: G. Smolak, Sheets and Siding; R. E. Parry, Shingles; S. E. Williams, Methods of Test
Keasbey and Mattison Co., C. R. Hutchcroft
Lehigh Portland Cement Co., S. B. Helms
National Bureau of Standards, D. E. Parsons (Temp. Chairman)
New York City, Board of Standards Appeals, B. A. Savage
New York State, Dept. of Public Works, J. W. Sussex
Portland Cement Assn., Wm. Lerch
Public Bldgs. Adm., Federal Works Agency, J. W. Strohman
Tilo Roofing Co., R. J. Tobin
Underwriters Laboratory, H. M. Robinson
U. S. Gypsum Co., C. C. Schuetz
U. S. Navy, Bureau of Yards and Docks, C. J. Ebert
U. S. War Dept., Corps of Engineers, E. H. Dhein

Organization was effected under the temporary chairmanship of Mr. D. E. Parsons of the National Bureau of Standards. It was considered advisable to continue with temporary officers, and, accordingly, in addition to Mr. Parsons, who was continued as Acting Chairman, Mr. Theodore I. Coe was elected as Temporary Vice-Chairman and Mr. Donald Tulloch as Temporary Secretary. Messrs. H. W. Greider, D. T. Colton, and C. R. Hutchcroft were recommended as additional members of the Advisory Subcommittee.

The main topic of discussion and action was that of determining the proper name and scope of the committee and the method of organization for carrying on the work. The group very wisely made a decision to concentrate its initial work on a few of the most important problems, including particularly methods of test for evaluating properties of the various asbestos-cement products.

There was considerable discussion on the philosophy and mechanics of organizing a series of subcommittees on each particular product or family of products, or whether the work would be expedited more rapidly if there was a subcommittee to consider specifications for all products and another one to consider tests for the various properties of products. It was finally agreed that for the present the subcommittee organization would be limited to the formation of one group to cover methods of test. There will, of course, be an advisory committee to be responsible for the administration of this new A.S.T.M. technical committee, this steering committee to canvass the field on existing problems and act accordingly in recommending further subcommittees.

New Committee on Quality Control Organized

Personnel and Scope Announced

THE emphasis placed on quality control as a result of expanded production brought about by the war accelerated the use of statistical methods in the presentation and analysis of test data and the application of this science to the control of quality. The Executive Committee accordingly authorized the organization of a new Committee E-11 on Quality Control of Materials, which held its organization meeting in Philadelphia, Pa., on June 10, 1946. At this meeting permanent officers were elected and a set of By-laws to govern the work of the committee was approved.

The officers and present membership of the committee are as follows:

Harold F. Dodge, *Chairman*, Bell Telephone Laboratories, Inc.
A. E. R. Westman, *Vice-Chairman*, Ontario Research Foundation
O. P. Beckwith, *Secretary*, Alexander Smith & Sons Carpet Co.
A. W. Carpenter, The B. F. Goodrich Co.
C. W. Churchman, University of Pennsylvania
J. H. Curtiss, National Bureau of Standards
Karl Fetters, Youngstown Sheet & Tube Co.
G. H. Harnden, General Electric Co.
H. F. Hebley, Pittsburgh Coal Co.
A. C. Holman, Western Electric Co., Inc.
J. T. MacKenzie, American Cast Iron Pipe Co.
Joseph Manuele, Westinghouse Electric Corp.
E. G. Olds, Carnegie Institute of Technology
R. F. Passano, Bethlehem Steel Co.
A. I. Peterson, RCA Victor Division
A. G. Scroggie, E. I. du Pont de Nemours & Co., Inc.
L. E. Simon, Aberdeen Proving Ground
T. S. Taylor, U. S. Testing Co.
John Tucker, Jr., National Bureau of Standards
S. S. Wilks, Princeton University

An Advisory Committee of seven members has been appointed, consisting of the following:

H. F. Dodge, *Chairman*
A. E. R. Westman, *Vice-Chairman*
O. P. Beckwith, *Secretary*
L. E. Simon (Term expiring in 1948)
G. H. Harnden (Term expiring in 1948)
H. F. Hebley (Term expiring in 1950)
R. F. Passano (Term expiring in 1950)

SCOPE

The committee will function under the following statement of scope:

The committee is organized to promote the knowledge of quality control methods and their application to specifications and methods of test. By quality control methods is meant those methods that have been developed on a statistical basis to control the quality of product through the proper relation of specification, production, and inspection as parts of a continuing process.

The committee is authorized to sponsor papers and discussions; to prepare reports, manuals and recommended practices; and to aid and advise the committees of the Society on the application of quality control methods in: (*a*) the collection, analysis, interpretation, and presentation of data; (*b*) preparing specifications and methods of test; (*c*) establishing specified limits in specifications, including the designation of numerical requirements; (*d*) preparing acceptance sampling plans to be used for determining conformity to specifications; and (*e*) setting up sampling plans for control of quality in manufacture.

With the organization of this new technical committee there has been transferred to it the responsibilities of two technical committees of Committee E-1 on Methods of Testing; namely, Technical Committee IX on Interpretation and Presentation of Data and Technical Committee XI on Designation and Interpretation of Numerical Requirements. The A.S.T.M. Manual on Presentation of Data and the Tentative Recommended Practices for Designation of Numerical Requirements in Standards (E 29-40 T), prepared by these E-1 committees, have been transferred to the jurisdiction of Committee E-11.

At its first meeting the committee considered the outline of a general program of work and a number of proposed projects were referred to its Advisory Committee for further study. A meeting of the E-11 Advisory Committee was held in Buffalo on June 27 during the Annual Meeting of the Society. A number of projects were carefully considered at this time and it was decided that the committee should first bring up to date the A.S.T.M. Manual on Presentation of Data. It was felt that the Manual might well be revised and reissued in several parts or sections.

The following Task Groups have accordingly been appointed:

Task Group 1: To prepare two sections of A.S.T.M. Manual on Quality Control of Materials, such sections to comprise revisions, essentially editorial, of (a) main section of A.S.T.M. Manual on Presentation of data and (b) Supplement A thereof on "Presenting Plus and Minus Limits of Uncertainty of an Observed Average."

Task Group 2: To prepare a section of A.S.T.M. Manual on Quality Control of Materials, such section to comprise editorial revision of Supplement B of A.S.T.M. Manual on Presentation of Data; content substantially unchanged except for modifications to treat separately charts for number of defects and charts for number of defectives.

Task Group 3: To prepare a Recommended Practice on the subject material of paragraphs 3, 4, 5, and 6 of E 29 - 40 T in a simplified form to be of maximum usefulness to specification-writing committees; and to make recommendations regarding ways and means of making available the remainder of material in E 29 - 40 T in a form most useful to A.S.T.M. membership.

List with Serial Designations of New and Extensively Revised Tentatives

Important Materials Covered

THE SOCIETY accepted at the Annual Meeting 45 new tentatives and 113 former tentative specifications and methods of test which have been revised this year. Of the revised tentative specifications and test methods, 19 have been extensively revised and the titles of these are given below (marked with an asterisk) with the list of those issued by the Society for the first time. Standing committees responsible for the various items are indicated in italics.

Steel

(Committee A-1)

Specifications:
- Low and Intermediate Tensile Strength Carbon-Silicon Plates of Structural Quality (Plates 2 in. and under in thickness) (A 283 - 46 T).
- Specifications for Intermediate Tensile Strength Carbon-Silicon Steel Plates for Machine Parts and General Construction (Over 2 in. in thickness) (A 284 - 46 T).
- Heat-Treated Alloy-Steel Bars (A 286 - 46 T).
- Rolled Carbon-Steel Locomotive Frames (A 287 - 46 T).

Magnetic Materials

(Committee A-6)

Methods:
- Test for Core Loss, Test for Frequencies up to 2000 Cycles and Ductility Tests of Magnetic Materials (A 34 - 46 T).

Non-Ferrous Metals and Alloys

(Committee B-5)

Specifications:
- *Cartridge Brass Cartridge Case Cups (B 129 - 46 T).
- *Gilding Metal Bullet Jacket Cups (B 131 - 46 T).

Recommended Practice:
- Preparing Tension Test Specimens for Copper-Base Alloy Castings (B 208 - 46 T).

(Committee B-7)

Specifications:
- Aluminum and Aluminum-Alloy Sheet and Plate (B 209 - 46 T).
- Aluminum-Alloy Drawn Seamless Tubing (B 210 - 46 T).
- Aluminum and Aluminum-Alloy Bars, Rods, and Wire (B 211 - 46 T).

(Committee B-9)

Methods:
- Test for Apparent Density of Metal Powders (B 212 - 46 T).
- Test for Flow Rate of Metal Powders (B 213 - 46 T).
- Test for Sieve Analysis of Granular Metal Powders (B 214 - 46 T).
- Sampling Finished Lots of Metal Powders (B 215 - 46 T).

Fire Tests; Lime; Concrete and Concrete Aggregates; Thermal Insulating Materials

(Committee E-5, formerly Committee C-5, C-7, C-9, and C-16 respectively)

Method:
- Test for Combustible Properties of Treated Wood by the Fire-Tube Test Method (E 69 - 46 T).

Specifications:
- Normal Finishing Hydrated Lime (C 6 - 46 T).
- Special Finishing Hydrated Lime (C 206 - 46 T).
- Hydrated Lime for Masonry Purposes (C 207 - 46 T).
- Structural Insulating Board Made from Vegetable Fibers (C 208 - 46 T).

Definitions of Terms:
- Relating to Concrete and Concrete Aggregates (C 125 - 46 T).

Methods:
- Testing Structural Insulating Board Made from Vegetable Fibers (C 209 - 46 T).

Pigments and Paint Materials

(Committee D-1)

Specifications:
- Titanium Dioxide Pigments (D 476 - 46 T).
- Pumice Pigment (D 867 - 46 T).

Methods:
- Test for Ester Value of Tricresyl Phosphate (D 268 - 46 T).
- Evaluating Degree of Resistance of Traffic Paint to Bleeding (D 868 - 46 T).
- Test for Evaluating Degree of Settling of Traffic Paint (D 869 - 46 T).
- Test for Changes in Protective Properties of Coatings of Paint, Varnish, Lacquer, and Related Products on Steel Surfaces When Subjected to Immersion (D 870 - 46 T), formerly Emergency Method ES - 35, revised.
- Testing Cellulose Acetate (D 871 - 46 T).

Petroleum Products

(Committee D-2)

Methods:
- *Test for Acid and Base Numbers of Petroleum Oils by Color-Indicator Titration (D 663 - 46 T).
- *Test for Acid and Base Numbers of Petroleum Products by Electrometric Titration (D 664 - 46 T).
- *Analysis of Petroleum Sulfonates (D 855 - 46 T).
- Test for Oxidation Stability of Aviation Gasoline (Potential Gum Method) (D 873 - 46 T).
- Test for Sulfated Residue from New Lubricating Oils (D 874 - 46 T), formerly Emergency Method ES - 43a, revised.
- Test for Olefins and Aromatics in Petroleum Distillates (D 875 - 46 T), formerly Emergency Method ES - 45a, revised.

Road and Paving Materials; Paper and Paper Products; Shipping Containers

(Committees D-4, D-6, and D-10)

Methods:
- Test for Sulfonation Index of Road Tars (D 872 - 46 T).
- *Test for Resistance of Paper to Passage of Air (D 726 - 46 T).
- *Test for Ply Adhesion of Paper or Vulcanized Fiber (D 825 - 46 T).
- Incline-Impact Test for Shipping Containers (D 880 - 46 T).

Electrical Insulating Materials

(Committee D-9)

Specifications:
Communication and Signal Pin-Type Lime-Glass Insulators (D 879 – 46 T), formerly Emergency Specifications ES - 41, revised.
*Laminated Thermosetting Materials (D 709 – 46 T).

Methods:
*Testing Varnishes Used for Electrical Insulation (D 115 – 46 T).
*Conditioning Plastics and Electrical Insulating Materials for Testing (D 618 - 46 T), jointly with Committee D-20.
Testing Nonrigid Polyvinyl Tubing (D 876 – 46 T).
Test for Dielectric Strength of Insulating Oil of Petroleum Origin (D 877 – 46 T).
Test for Inorganic Chlorides and Sulfates in Insulating Oils (D 878 – 46 T).

Rubber Products, Textiles

(Committees D-11 and D-13)

Specifications:
*Friction Tape for General Use for Electrical Purposes (D 69 – 46 T), revised to include Emergency Alternate Provisions EA – D 69.
*Rubber Insulating Tape (D 119 – 46 T), revised to include EA – D 119.

Methods:
*Testing and Tolerances for Cotton Tire Cord (D 179 – 46 T).
*Testing and Tolerances for Continuous Filament Rayon Yarns (D 258 – 46 T).
*Quantitative Analysis of Textiles (D 629 – 46 T).

Recommended Practice:
*Conditioning of Rubber and Plastic Materials for Low-Temperature Testing (D 832 – 46 T).
Universal System of Yarn Numbering (D 861 – 46 T).
Testing and Tolerances for Rayon Tire Cord (D 885 – 46 T).
Test for Compatability of Glass Yarn with Insulating Varnish (D 886 – 46 T).

Definition of Terms:
*Relating to Textile Materials (D 123 – 46 T).

Industrial Aromatic Hydrocarbons; Naval Stores; Plastics

(Committees D-16, D-17, D-20)

Methods:
Test for Specific Gravity of Industrial Aromatic Hydrocarbons (D 891 – 46 T).
Test for Volatile Oil in Rosin (D 889 – 46 T).
Test for Water in Liquid Naval Stores (D 890 – 46 T).
Test for Deviation of Line of Sight through Transparent Plastics (D 881– 46 T).
Test for Tensile Properties of Thin Plastic Sheets and Films (D 882 – 46 T).
Estimating Blocking of Plastic Sheets (D 884 – 46 T).

Definitions of Terms:
Relating to Plastics (D 883 – 46 T).
*Relating to Naval Stores and Related Products (D 804 – 46 T).

Water for Industrial Uses

(Committee D-19)

Method:
Test for Dissolved Oxygen in Industrial Waters (D 888 – 46 T).

Recommended Practice:
Field Sampling of Water-Formed Deposits (D 887 – 46 T).

Summary of Important Current Activities in Technscal Committees Especially on Standardization Projects

Broad Review Indicates Large Volume of Work

IT WILL be evident from reading the statements appearing below that there is a tremendous volume of work under way and contemplated in the Society's large number of technical committees. Much of the information summarized here has been furnished by officers of the technical committees, each of whom was asked to send to Headquarters a statement of work. Some of the information has been taken from reports of committees as presented at the Society's Annual Meeting in Buffalo.

Ferrous and Non-Ferrous Metals—"A" and "B" and Some "E" Committees

Arrangement of Material

The material which follows is arranged in general in the order of the designations of the Technical Committees, the "A" and "B" groups, Ferrous and Non-Ferrous appearing first, followed by the "C" and "D" groups. However, the latter statements are broadly divided according to "constructional" and "nonconstructional" materials. The latter will be covered in the October BULLETIN.

STEEL

After a very active year, Committee A-1 on Steel continues work on several important problems, including the perplexing one of requirements for structural steel for welding. Decision was reached in Buffalo to prepare a separate specification incorporating the latest ideas with respect to chemistry and physical properties, with the thought in mind that after this has been issued for some time consideration will be given to its relationship with the current specification A 7 so widely used for riveted and related construction. A new specification is to be drafted for concrete reinforcement bars made from unidentified billets. In the field of bars there have been drafted requirements covering hot-rolled carbon-steel bars subject to tensile strength requirements. A special new subcommittee will draft a specification for what are termed "common" carbon-steel bolts and bolting material as distinct from the material used for flanges, fittings, etc., particularly at high-temperature service. The subcommittee on pipe and tubing has a number of additional changes it is studying, and in the field of sheets and sheet steel, which also involves hot- and cold-rolled strip, a new hot-rolled strip specification is needed.

CAST IRON

Committee A-3 is reviewing the Standard Specifications for Cast Iron Culvert Pipe (A 142) to see whether these are in need of revision. A recheck is being made of Tentative Recommended Practice for Torsion Tests of Cast Iron (A 260) before this will be recommended for advancement to standard. A subcommittee is investigating current methods of impact testing to determine if specifications on impact testing are feasible, while another subcommittee is checking to see whether specifications can be set for cast irons used at temperatures higher than 650 F., largely for nonpressure containing parts.

CORROSION OF IRON AND STEEL

Subcommittee VI on Specifications for Metallic-Coated Products is currently giving attention to the preparation of specifications for long terne sheets and galvanized rigid electrical conduit. Subcommittee VII on Methods of Testing is working on a program for further study of the limits of accuracy of pertinent test

methods, while Subcommittee VIII on Field Tests of Coatings will publish next year the detailed records of performance of the wire, fencing and strand products inspected during the current year. Additional outdoor exposure tests on hardware parts are in the planning stage.

Magnetic Properties

The development by Committee A-6 of a standard form for preparing specifications for electrical sheet and strip is still under way. The committee hopes to have something definite to propose during the coming year. Plans are being made to resume active work on the use of the 25-cm. testing frame for d-c. measurements so that for laminated material all of the necessary magnetic tests can be carried out on the same specimen. Laboratory work will be continued on the methods for testing at higher than power frequencies with the end in view of extending the range to frequencies higher than 2000 cycles per second.

Iron-Chromium, Iron-Chromium-Nickel and Related Alloys

The Subcommittee on Classification of Data of Committee A-10 has compiled data on cast alloys as a supplement to the data on wrought alloys published some years ago. This work has now progressed to a point where the final compilation is ready for review by the committee.

The Subcommittee on Methods of Corrosion Testing is working out details of a program on atmospheric corrosion tests of corrosion-resistant steels which is expected to get under way before the end of the current year. Consideration is being given to the techniques of mechanical testing of corrosion-resistant steels with special reference to the effect of specimen shape and size and determination of yield strength properties. The Subcommittee on Metallography is working out an important new program relative to the etching and identification of sigma phase or other constituents in high-chromium and high-chromium-nickel steels.

A specification for 18 per cent chromium, 8 per cent nickel spring wire is in the course of preparation and specifications for billets for forging will next be undertaken.

Non-Ferrous Metals and Alloys

Committee B-2 has recently conducted a survey to see whether there is need for specifications for tin and for antimony and while it has decided that nothing should be done with respect to tin at this time specifications for antimony should be prepared. This work has been assigned to a small subgroup. There is also indicated a demand for A.S.T.M. specifications for cadmium metal and the committee is looking into this subject as well.

In cooperation with Committees B-1 and B-5, at the suggestion the of Non-Ferrous Coordinating Committee, a Joint Committee is being set up to consider preparing a Classification of Coppers. This project has been under discussion for some years and it appears now that a satisfactory procedure has been worked out which will permit the work to proceed rapidly.

Corrosion of Non-Ferrous Metals and Alloys

Committee B-3 is working out, in cooperation with Committee A-10, certain modifications of the Recommended Practice for Plant Corrosion Tests (A 224) so that the method may be applicable to both ferrous and non-ferrous alloys. The committee is also working on a study of various factors affecting the method of Salt Spray (Fog) Testing (B 117) and, in particular, is setting up tests to study the settling rate of the fog.

In cooperation with Committee B-7 on Light Metals and Alloys, an attempt is being made to determine whether there is need at this time for additional atmospheric exposure tests of aluminum and magnesium alloys and, if so, what alloys should be tested. The committee is also making a survey of methods and instruments currently available for measuring the weather factors thought to be important with respect to atmospheric corrosion. One set of the stainless steel disk samples coupled to other metals which were exposed in 1941 will be removed this summer at the end of the five-year exposure period and a report prepared on their condition.

Electrical Heating, Resistance, and Related Alloys

Committee B-4 having completed the new Tentative Specifications for Nickel-Chromium-Iron Alloy Castings (35–15 class), for High-Temperature Service (B 207), is giving consideration to the preparation of specifications for alloy castings containing higher proportions of nickel and chromium. The committee is studying methods of test for determining the comparative performance of mounted thermostat elements and micro-hardness test methods of the components of thermostat metals.

The cathode section of Subcommittee VIII on Metallic Materials for Radio Tubes and Incandescent Lamps expects to continue its very active work during the coming year, collecting data and studying the effects of composition and other variables on the emissivity of oxide-coated cathodes. Studies are also being made on methods of tension testing of fine wire and of the magnetic permeability of slightly magnetic materials used in lamps and electronic devices. New specifications for glass sealing alloys are in the course of preparation.

Subcommittee IX on Tests for Alloys in Controlled Atmospheres is outlining additional tests (which were postponed during the war) to determine the effect of humidity in hydrogen atmosphere and of sulfur and humidity in "combusted gas."

Subcommittee X on Contact Materials has made arrangements to study in seven laboratories the electrical characteristics of contacts along the following lines: (1) surety of making a circuit, (2) welding characteristics, (3) arcing characteristics, (4) contact resistance build-up, and (5) wear. A method of test for hardness of contact materials is being prepared, including the superficial Rockwell test and the Vickers test. Subcommittee X is also putting into final form the proposed standard for dimensions of composite contact-tipped screws and studs, on which they have been working during the past year.

Copper and Copper Alloys, Cast and Wrought

Committee B-5 continues an active review of all the specifications and methods of test under its jurisdiction. Among future subjects are the question of including requirements for plate and rolled bar in the sheet and strip specifications, and a review of the grain size requirements in the Specifications for Sheet Brass (B 36). Also in the course of preparation are new specifications for copper-nickel-zinc rod and bar to replace Specifications B 151 and the possible revision of the tempers and physical properties in the Specifications for Free-Cutting Brass Rod (B 16).

Among other subjects being studied are the possibility of substituting maximum tensile strength values instead of minimum elongation in several wire specifications and the addition of a new alloy and the revision of the physical properties in the Specifications for Copper-Nickel-Zinc Alloy Wire (B 206).

The Subcommittee on Pipe and Tube is currently reviewing the tensile requirements in the Specifications for Copper Water Tube (B 88) to bring them in line with those in the Specifications for Seamless Copper Tubes (B 75). Another subject being studied is the chemical limits in the various tube specifications to bring them in line with the chemical requirements for similar alloys in other products.

In the field of castings and ingots for remelting the committee is aiding in setting up an inter-society committee to study the subject of test bars and test bar practice. This group will review

work on this subject at Battelle Memorial Institute, the Naval Research Laboratory, and the British Standards Institution.

The committee is also working on the development of methods of tension testing for thin sheet metals and for rod stock. It is also developing definitions of terms relating to copper and brass and a classification of wrought copper alloys.

Die-Cast Metals and Alloys

Committee B-6 expects to review the mechanical property data for the Zinc-Base Alloy Die Castings (B 86) in the light of studies now under way. Through the distribution of a questionnaire it is also collecting data on the speed of tension tests for die cast specifications and studying the value of tension impact testing as a measure of ductility of die cast alloys.

It is expected that a paper will be prepared for publication on the 15-year atmospheric exposure test data on the aluminum, magnesium, and zinc base alloys. Another item is the collection of data on the mechanical properties of brass alloys covered by their specifications.

Light Metals and Alloys, Cast and Wrought

Committee B-7 is currently engaged in a complete overhauling of all aluminum and magnesium specifications, commencing with aluminum in ingot form and extending through alloy castings and wrought forms. Existing specifications are in course of revision and new specifications prepared to bring A.S.T.M. requirements in line with current practice. One standard specification; namely, B 24–44 covering aluminum ingots for remelting has already been modernized.

The three specifications for casting ingots are being combined into a single specification as the casting specifications have been coordinated to eliminate nonessential differences. New wrought aluminum specifications have been prepared covering Sheet and Plate, Tubing, Bars, Wires, and Extruded Shapes, which render obsolete the former specifications.

A new specification covering magnesium alloy tubing has also been prepared.

Two casting specifications, namely, B 24 and B 108, have had their composition limits revised; and a study is being made of the information and mechanical property data, which will bring these specifications into line with the advances made in the aluminum casting industry during the war. Special task groups are actively engaged in preparing these data.

The tentative code system for magnesium alloys is believed to be working satisfactorily. The present code system for aluminum alloys, however, has met with some adverse comment and a modification is being prepared in line with suggestions made by the Aluminum Association and the Aluminum Research Institute.

Two investigations are under way dealing with the limits of error to be expected in a determination of elongation and with a recently developed instrument for measuring the thickness of oxide coatings on aluminum by nondestructive methods.

Electrodeposited Metallic Coatings

Committee B-8 has started outdoor exposure tests at New York, State College, Pa., Pittsburgh, Kure Beach, N. C., comparing the relative protective value of various copper-nickel-chromium coatings on high-carbon steel. The committee's tests of lead-coated steel in atmospheric exposure are also continuing.

Metal Powders and Metal Powder Products

It is expected that committee B-9's glossary of terms used in powder metallurgy will be completed and published during the current year and also that it will be possible to establish standard sizes for test bars for use in the industry.

The Subcommittee on Metal Powders is working closely with the Metal Powder Association on the establishment of a satisfactory test on methods of compressibility. The subcommittee is also working on methods of subsieve particle size testing and on methods of chemical analysis for (1) oxygen content or "hydrogen loss," (2) total iron in iron powder, and (3) insoluble content of metal powders. Committee E-3 on Chemical Analysis is cooperating in this work.

The Subcommittee on Metal Powder Products is preparing an Appendix to the Tentative Specifications for Metal Powder Sintered Bearings (Oil Impregnated) (B 202) which will give a standard list of bearing sizes for use in the industry.

The Section on Cemented Carbides is studying the (1) transverse rupture test, (2) hardness test, and (3) analysis and grain size determination, while the Section on Electrical Parts is studying magnetic test methods for pressed and sintered pole pieces and also studying electrical contacts made from metal powders. No standardization is being attempted at this time in the field of friction materials.

Metallography

In Committee E-4 during the next year the major emphasis will be in the establishment of new methods in X-ray determination work and grain count. Subcommittee VI is currently working on the drafts for recommended practice for the determination of single crystal orientation and also for the determination of preferred orientation, and it is hoped that these will be in such form that they may be presented by next year.

The newer committees on grain size, which did not have the opportunity to begin functioning during the War, have laid out programs aimed toward nonferrous materials—particularly aluminum and magnesium—at first, and later a modernizing of the so-called brass standard.

As soon as the personnel complement has been established for two additional groups, the committee will review the Definition of Terms Relating to Metallography (E 7 – 27) and also start work on methods for the determination of decarburization in steel, especially tubing.

Committee E-4 also has under discussion with the Society of Automotive Engineers a possible change in the latter's method for determination of inclusion content in steel which will bring the S.A.E. method into exact correspondence with the A.S.T.M. method as the two now do not agree in the expression of results due to differing classification of inclusions of one unit in length.

Water for Industrial Uses

The Editorial Subcommittee of Committee D-19 is working on a projected Manual on Industrial Waters. This will include Methods of Sampling, Analysis and Classification. Other chapters of the Manual will be devoted to uses of water, difficulties, composition, sampling, analysis, and identification of water-formed deposits. Definitions published by the committee will be included in a glossary. Chapters on the properties of water and on the interpretation of analytical results have also been suggested.

Present water sampling methods (D 510 and D 860) are being reviewed and sections established to study sampling procedures for water-formed deposits and for steam. Active review of the analytical methods developed by the committee continues with emphasis on conductivity and polarographic methods. The Method of Test with the N.D.H.A. Corrosion Tester is nearing completion.

Fatigue

The newly organized Committee E-9 is planning to issue as soon as possible an up-to-date Manual on Recommended Practice for Fatigue Testing. It is expected that this manual will be composed of a number of sections under the following chapter headings: Introduction; Nomenclature; Machines; Specimens and Preparation; Test Procedure and Technique; Presentation of Data; Interpretation of Data; and Bibliography. The initial manual will cover only conventional methods of fatigue test specimens but will later be expanded to cover other types of fatigue testing. Information on pitfalls that may be expected in fatigue testing will be worked in as footnotes in the several sections.

Constructional Materials—in the "C" and "D" Groups

Cement

Progress has been made by Committee C-1 on a method for determining the titanium oxide content of portland cement and efforts continued to promote uniformity between the Federal specifications and A.S.T.M. on all methods of chemical analysis (C 114). Studies are in progress on the methods of test for compressive strength of mortars, on Specifications for Portland-Puzzolanic Cement, and further questions relating to Portland Blast-Furnace Slag Cement. A study has been completed on the lean mortar bar test as a measure of the sulfate resistance of portland cements, as well as its use in the combination of reactive aggregates with cements of various alkali contents. The effect of gypsum content on the properties of cements and concretes, and a test for the optimum SO_3 content for individual cements is receiving consideration by subcommittees concerned.

Concrete

Two new subcommittees of Committee C-9 will study, respectively, admixtures for concrete used either as additives or interground, and problems presented by aggregates which react chemically with cement. Other studies will concern specifications for "durable particles" and for deleterious substances as well as resistance to abrasion of aggregates. The freezing and thawing test of aggregates and concrete continues to remain a source of much discussion and need for further research in finding a unified procedure. The Buffalo meeting included a symposium on this subject which again pointed out the need for further research and correlation which Committee C-9 is fully cognizant of and has included in its program. Immediate action on a revision of the present standard on Ready-Mixed Concrete (C 94) is likely. Projects are being inaugurated on devising a larger slump cone for large-aggregate concrete (C 143), determination of lithographic composition of aggregates, determination of effect of size of container for drying samples and effect of raising the temperature of the solution from 70 to 80 F. in the Soundness of Aggregates Test (C 88).

Lime

The most immediate project in Committee C-7 is a proposed master specification for quicklimes and hydrated limes for the chemical industry. This was discussed at the Annual Meeting in Buffalo. A questionnaire will be circulated to the members to obtain data on the specifications that they have to meet in this respect. Attention will be given to performance tests on lime and to correlation of Specifications and Tests on Hydraulic Lime with those of Federal and other agencies. A method for the determination of the fluorine content of lime along with the lead, arsenic, and other constituents is receiving attention.

Gypsum

Review of specifications will be made by Committee C-11 on gypsum plaster for general accord with the revised Federal specifications, and for comparison of advantages of wet strength over dry strength requirements. Consideration will be given to the substitution of compressive strength in place of tensile strength requirements in the Standard Specification for Calcined Gypsum for Dental Plasters (C 72). New requirements in the Gypsum Wallboard and Lath Specifications (C 36 and C 37) to provide for new types now produced will be studied.

Mortars and Masonry Units

Committee C-12 plans development of reproducible tests on consistency and field tests of mortar, on efflorescing tendencies of mortars and have already discussed the adoption of the National Lime Association specification for mortar. Committee C-15 on Masonry Units will be concerned mainly with a scrutiny of present specifications for possible revision.

Fire Tests

Development of a method of obtaining representative samples from lots of treated material will be undertaken by Committee C-5. Methods of testing window assemblies, of determining the speed and extent of flame travel over acoustical and similar finishes, and tests of roof coverings all have received attention and show progress.

Refractories

Further revision of the Method of Panel Test for Resistance to Thermal and Structural Spalling of Refractory Brick (C 180) to include material contained in the Recommended Practice for the Refractories Fellowship, Mellon Institute, is being made. Possible improvement of the linear change procedure in the Standard Method of Testing Insulating Fire Brick (C 93) is contemplated. The extent of temperature variation in connection with the P.C.E. Test Method as found in various furnaces will be investigated. The desirability of reporting volumes in the Method of Test for Permanent Linear Change After Reheating of Refractory Brick (C 113), a continuation of the investigation of Methods for Determining Thermal Conductivity (C 201), adaptation of a manuscript on elementary procedures for microscopic examination of refractory materials, test procedures covering hot strength, shrinkage, spalling and other types of resistance—confined initially to silicon carbide, bonded fused alumina, bonded mullite, molten case mullite, zircon and the purer grades of magnesia, and preparation of definitions of certain refractories are other current projects of Committee C-8. Results of many of these studies and of the other research and standardization work carried out since 1943 will be included in a new edition of the C-8 Manual on Refractory Materials. The last edition of the Refractories Manual was issued in June, 1943, so the new book to come out this fall will be considerably expanded.

Thermal Insulating Materials

Projects under way in Committee C-16 include a study of the impact test and measurement of deflection during flexure and at breaking point of preformed block and pipe insulation; specifications for blanket and bat thermal insulation; a study of the physical properties of both mineral and vegetable materials for loose-fill insulation; and a study of the application of the rational dimensional standard for use by the 85 per cent magnesia industry. Studies of vapor barriers are under way especially in the air conditioning and refrigeration fields. The development of a standard pipe conductometer will be evolved from data using three methods of test for pipe insulation conductivity considered by the joint committee working with the A.S.H.V.E. and the N.R.C.

Natural Building Stone

Steps have been taken to bring the Standard Method of Test for Absorption and Apparent Specific Gravity of Natural Building Stone (C 97) more in line with similar procedures on other materials.

Road and Paving Materials

Revision of the Standard Test for Penetration of Bituminous Materials (D 5) is in the final stages of consideration. Changes in the Test for Distillation of Cut-Back Asphaltic Products (D 402) are receiving current attention. A need for improved specifications on tar and a request for collection of all known data on stripping characteristics of aggregates was expressed at the meetings of Committee D-4 in Buffalo.

Wood

A revision of the standard specifications for Structural Wood Joint and Plank, Beams and Stringers and Posts and Timbers (D 245) is planned in terms of

providing material suitable for tension members in trusses and in converting present grades into cutting grades. Revisions have been suggested in the Specifications for Round Timber Piles (D 25).

Asphalt Waterproofing and Roofing Materials

The newest developments in Committee D-8 are a cooperative study and investigation toward standardizing a stain test based on the Schweyer-Howell Test and a study of test methods connected with the problem of staining of paint coatings by asphalts used in construction of floor coverings. Specifications are also being prepared on grading of roofing granules.

Shipping Containers

Projects which are in their final stages and will undoubtedly bring forth recommendations during the year from Committee D-10 cover three test methods on containers—a Spray Test Method, a Test for Water Vapor Permeability, and a Submersion Test. The application of existing and proposed standard tests to inner packing is being studied. The vibration test method is being studied further for developing better agreement on details of the test. A large list of definitions of proposed standard terms is being revised. More emphasis will be given to testing methods on other types of containers than boxes, such as bags, drums and barrels.

Soils

Plans are made for an early review by Committee D-18 on Soils for Engineering Purposes of the Definitions Relating to Soil Mechanics (D 653), and for revision of existing standards on Preparation of Soil Samples for Mechanical Analysis (D 421), Liquid Limit of Soils (D 423), and Tentative Method for Moisture-Density Relations (D 698).

Building Constructions

The initial recommendations that will emanate from Committee E-6, which committee was organized early in 1946, will pertain to strength tests of various kinds, especially in the housing field. The subcommittee on panels is making a study of existing manuals on structural properties of low-cost house construction for the purpose of formulating standard methods of tests.

Parts Testing—Accelerated Life Testing

Through the cooperation of E. W. Upham, Chrysler Corp., who has taken a leading part in stimulating interest in the Society in the formation of committees dealing with simulated service testing, testing of parts and assemblies and others, we are able to show a photograph of a most interesting display arranged cooperatively in the Detroit area, and a statement on this particular phase of the exhibit. Reference to some of the A.S.T.M. activities in this general field, including the Symposiums on Bearings, Fatigue, and Testing of Parts and Assemblies, can be found in the news account of the A.S.T.M. Annual Meeting in the forepart of this Bulletin. These symposiums, to be issued as separate publications, are further evidence of the importance technical men are assigning this whole field. A statement on the display in Detroit follows:

The rapidly increasing interest in parts testing and accelerated life testing was evident in a "Materials" display which was a part of an S.A.E. Safety Exhibit during the recent Golden Jubilee of the automotive industry in Detroit.

The S.A.E. Safety Exhibit was assembled to show the progress of safety and of safety features in automotive equipment during the fifty years of automobile development. Various sections of the exhibit were devoted to such subjects as Brakes, Lighting, Safety Glass, Bodies, Tires, Rims and Wheels, Noise and Vibration, Inspection, Accessories, and Materials.

In the Materials Section, permanent testing units loaned by various automotive laboratories were in actual operation. These were setups where actual parts were being subjected to vibratory stresses simulating those of actual operation in service. Testing equipment included those for life testing of propeller shafts, crankshafts, oil line tubing and connections, crankshaft sections, and hydraulic brake hose. The testing of the hydraulic brake hose has been standardized by a joint S.A.E.-A.S.T.M. Committee (Standard Designation—D 571).

Other operating units on display were two R. R. Moore Machines, and two Krause machines for fatigue testing of standard specimens. Equipment for demonstrating the application of photoelastic methods of stress analysis, Magnaflux and Zyglo, Sonogauge testing equipment for detection of internal flaws, and a display of castings and X-ray transparencies illustrating the use of X-ray in foundry development of castings were also a part of the exhibit.

The Safety Exhibit was open to the public for the week of June 3 to June 9 and the total attendance was estimated at better than 150,000.

E. W. Upham

List of Technical Committees and Officers

ALTHOUGH complete information will be published in the 1946 Year Book, on the personnel and officers of A.S.T.M. technical committees, this book will not be available until later in the year and hence the list given below showing the chairmen and secretaries of the technical committees will be of interest and service. This year each of the committees has held its election of officers in accordance with the Society regulations which provide for this election in the even-numbered years, and in the following list an asterisk will indicate the election of new officers.

TECHNICAL COMMITTEES, CHAIRMEN AND SECRETARIES

COMMITTEE	CHAIRMAN	SECRETARY
A-1 on Steel	N. L. Mochel, Westinghouse Electric Corp., Philadelphia, Pa.	[1]
A-2 on Wrought Iron	....	James Aston, Pittsburgh, Pa.
A-3 on Cast Iron	J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala.	C. O. Burgess, Union Carbide and Carbon, Research Laboratories, Inc., Niagara Falls,
A-5 on Corrosion of Iron and Steel	*T. R. Galloway, Consolidated Edison Co. of New York, Inc., New York, N. Y.	
A-6 on Magnetic Properties	Thomas Spooner, Westinghouse Electric Corp., East Pittsburgh, Pa.	R. L. Sanford, National Bureau of Standards, Washington, D. C.
A-7 on Malleable-Iron Castings	*W. A. Kennedy, Grinnell Co., Inc., Providence, R. I.	H. A. Schwartz, National Malleable and Steel Castings Co., Cleveland, Ohio
A-9 on Ferro-Alloys	J. H. Critchett, Union Carbide and Carbon Research Laboratories, Inc., New York.	A. P. Spooner, Bethlehem Steel Co., Inc., Bethlehem, Pa.
A-10 on Iron-Chromium, Iron - Chromium - Nickel and Related Alloys	(To be elected)	
B-1 on Wires for Electrical Conductors	J. H. Foote, The Commonwealth and Southern Corp., Jackson, Mich.	E. H. Kendall, Consumers Power Co., Jackson, Mich.
B-2 on Non-Ferrous Metals and Alloys	E. E. Thum, *Metal Progress*, Cleveland, O.	G. H. LeFevre, U. S. Smelting, Refining and Mining Co., New York, N. Y.
B-3 on Corrosion of Non-Ferrous Metals and Alloys	H. S. Rawdon, Bethesda, Md.	A. W. Tracy, The American Brass Co., Waterbury, Conn.
B-4 on Electrical-Heating, Electrical-Resistance and Electric-Furnace Alloys	*J. W. Harsch, Leeds and Northrup Co., Philadelphia, Pa.	F. E. Bash, Driver-Harris Co. Harrison, N. J.
B-5 on Copper and Copper Alloys, Cast and Wrought	G. H. Harnden, General Electric Co., Schenectady, N. Y.	V. P. Weaver The American Brass Co., Waterbury, Conn.
B-6 on Die-Cast Metals and Alloys	J. R. Townsend, Bell Telephone Laboratories, Inc., New York, N. Y.	G. L. Werley, The New Jersey Zinc Co. (of Pa.), Palmerton, Pa.
B-7 on Light Metals and Alloys, Cast and Wrought	*I. V. Williams, Bell Telephone Laboratories, Inc., New York, N. Y.	J. J. Bowman, Aluminum Company of America, Pittsburgh, Pa.
B-8 on Electrodeposited Metallic Coatings	R. J. McKay, The International Nickel Co., Inc., New York, N. Y.	C. H. Sample, Rheem Research Products, Inc., Baltimore, Md.
B-9 on Metal Powders and Metal Powder Products	W. A. Reich, General Electric Co., Schenectady, N. Y.	W. R. Toeplitz, Bound Brook Oil-Less Bearing Co., Bound Brook, N. J.
C-1 on Cement	*F. H. Jackson, Public Roads Administration, Washington, D. C.	G. E. Warren, Southwestern Portland Cement Co., Osborn, Ohio
C-4 on Clay Pipe	J. C. Riedel, New York, N. Y.	R. G. Scott, Chicago, Ill.
C-6 on Drain Tile	Anson Marston, Iowa State College, Ames, Iowa	W. J. Schlick, Iowa State College, Ames, Iowa
C-7 on Lime	W. C. Voss, Massachusetts Institute of Technology, Cambridge, Mass.	*G. J. Fink, National Lime Assn. Washington, D. C.
C-8 on Refractories	J. D. Sullivan, Battelle Memorial Institute, Columbus, O.	S. M. Phelps, Mellon Institute of Industrial Research, Pittsburgh, Pa.
C-9 on Concrete and Concrete Aggregates	*K. B. Woods, Purdue University, Lafayette, Ind.	Stanton Walker, National Sand and Gravel Association, Washington, D. C.
C-11 on Gypsum	L. S. Wells, National Bureau of Standards, Washington.	H. J. Schweim, Gypsum Assn., Chicago, Ill.
C-12 on Mortars for Unit Masonry	Theodore I. Coe, Washington, D. C.	H. C. Plummer, Structural Clay Products Institute, Washington, D. C.
C-13 on Concrete Pipe	T. F. Doll, Standard Oil Co., Whiting, Ind.	*H. F. Peckworth, American Concrete Pipe Association, Chicago, Ill.
C-14 on Glass and Glass Products	Louis Navias, General Electric Co., Schenectady, N. Y.	S. R. Scholes, N. Y. State College of Ceramics, Alfred, N. Y.
C-15 on Manufactured Masonry Units	D. E. Parsons, National Bureau of Standards, Washington, D. C.	J. W. Whittemore, Virginia Polytechnic Institute, Blacksburg, Va.

[1] Pending election of a new secretary, R. J. Painter is continuing to handle these duties.

Psychrometric Data

J. H. WALKER, Vice-President, Detroit Edison Co., Detroit, has been appointed Chairman of the International Joint Committee on Psychrometric Data formed under the sponsorship of the American Society of Heating and Ventilating Engineers. The primary objective of the committee is to establish tables on the properties of air and water vapor mixtures, for adoption as an international standard, thus eliminating the discrepancies in the values which exist in the several tables now in use. A comparison of the values from the various tables used by the participating organizations has been completed and the committee is now in a position to actively proceed with the project of the standard tables.

The debt of the nation to its scientific and engineering talent is measured by the difference between victory and defeat in the war that has been fought. We could not have won with the arms we had in 1940, and this does not detract in any way from the matchless courage of our fighting men or the strategic skill of our leaders on the field of battle.

There is no security in huge depots of surplus weapons left over after a war. Many of them are already obsolete. Until the time when international organization for peace will put a finish to wars as the means of settling disputes among nations—and I trust that that time is not far distant—the strongest bulwark of our security rests in the genius and skill of our scientists and engineers who are still searching out to the endless frontier.

From an address by Secretary of War Patterson before the Engineering Society of Detroit entitled "The Engineer's Place in National Security."

C-16 on Thermal Insulating Materials	*Ray Thomas, Carbide and Carbon Chemicals Corp., South Charleston, W. Va.	*K. M. Ritchie, Baldwin-Hill Co., Trenton, N. J.
C-17 on Asbestos-Cement Products	*D. E. Parsons, National Bureau of Standards, Washington, D. C.	*Donald Tulloch, Jr., Asbestos Cement Products Association, Philadelphia, Pa.
C-18 on Natural Building Stones	*Oliver Bowles, U. S. Bureau of Mines, Washington, D. C.	D. W. Kessler, National Bureau of Standards, Washington, D. C.
D-1 on Paint, Varnish, Lacquer, Related Products	W. T. Pearce, Bala-Cynwyd, Pa.	C. H. Rose, National Lead Co., Brooklyn, N. Y.
D-2 on Petroleum Products and Lubricants	*C. Dantsizen, General Electric Co., Schenectady, N. Y.	*W. T. Gunn, American Petroleum Institute, New York.
D-3 on Gaseous Fuels	A. W. Gauger, Pennsylvania State College, State College,	R. M. Conner, American Gas Association, Cleveland, Ohio
D-4 on Road and Paving Materials	*W. J. Emmons, University of Michigan, Ann Arbor, Mich.	*B. A. Anderton, Allied Chemical and Dye Corp., Edgewater, N. J.
D-5 on Coal and Coke	A. C. Fieldner, U. S. Bureau of Mines, Washington, D. C.	W. A. Selvig, Pittsburgh, Pa.
D-6 on Paper and Paper Products	L. S. Reid, Metropolitan Life Insurance Co., New York.	G. H. Harnden, General Electric Co., Schenectady, N. Y.
D-7 on Wood	Hermann von Schrenk, St. Louis, Mo.	L. J. Markwardt, U. S. Forest Products Laboratory, Madison, Wis.
D-8 on Bituminous Waterproofing and Roofing Materials	J. S. Miller, Rahway, N. J.	*H. C. Howell, Barber Asphalt Corp., Barber, N. J.
D-9 on Electrical Insulating Materials	*R. W. Orr, Radio Corp. of America, Camden, N. J.	W. A. Zinzow, Bakelite Corp., Bound Brook, N. J.
D-10 on Shipping Containers	*T. A. Carlson, U. S. Forest Products Laboratory, Madison, Wis.	E. R. Stivers, Package Research Laboratory, Rockaway, N. J.
D-11 on Rubber and Rubber-like Materials	Simon Collier, Johns-Manville Corp., New York, N. Y.	Arthur W. Carpenter, The B. F. Goodrich Co., Akron.
D-12 on Soaps and Other Detergents	B. S. Van Zile, Hercules Powder Co., Wilmington, Del.	*J. C. Harris, Monsanto Chemical Co., Dayton, Ohio
D-13 on Textile Materials	H. J. Ball, Lowell Textile Institute, Lowell, Mass.	W. H. Whitcomb, 41 Norman Ave., Cranston, R. I.
D-14 on Adhesives	R. C. Platow, Bell Telephone Laboratories, Inc., Murray Hill, N. J.	L. P. Hart, Jr., General Electric Co., Pittsfield, Mass.
D-16 on Industrial Aromatic Hydrocarbons	*D. F. Gould, Brunswick Radio Corp., New York, N. Y.	W. L. Douthett, The Texas Company, New York, N. Y.
D-17 on Naval Stores	V. E. Grotlisch, Department of Agriculture, Washington, D. C.	W. A. Kirklin, Hercules Powder Co., Wilmington, Del.
D-18 on Soils for Engineering Purposes	E. J. Kilcawley, Rensselaer Polytechnic Institute, Troy, N. Y.	K. F. Vernon, U. S. Bureau of Reclamation, Washington, D. C.
D-19 on Water for Industrial Uses	Max Hecht, Pittsburgh, Pa.	R. E. Hall, Pittsburgh, Pa.
D-20 on Plastics	Robert Burns, Bell Telephone Laboratories, Inc., New York, N. Y.	*A. J. Warner, Federal Telecommunication Laboratories, Newark, N. J.
E-1 Methods of Testing	W. H. Fulweiler, Philadelphia, Pa.	P. J. Smith, American Society for Testing Materials.
E-2 on Spectrographic Analysis	*B. F. Scribner, National Bureau of Standards, Washington, D. C.	Mary E. Warga, University of Pittsburgh, Pittsburgh, Pa.
E-3 on Chemical Analysis of Metals	G. E. F. Lundell, National Bureau of Standards, Washington, D. C.	J. W. Stillman, E. I. du Pont de Nemours and Co., Inc., Wilmington, Del.
E-4 on Metallography	L. L. Wyman, General Electric Co., Schenectady, N. Y.	*Mary Norton, Watertown Arsenal, Watertown, Mass.
E-5 on Fire Tests of Materials and Construction	S. H. Ingberg, National Bureau of Standards, Washington.	H. M. Robinson, Underwriters' Laboratories, Inc., Chicago.
E-6 on Methods of Testing Building Constructions	*L. J. Markwardt, U. S. Forest Products Laboratory, Madison, Wis.	*J. H. Courtney, National Bureau of Standards, Washington, D. C.
E-7 on Radiographic Testing	H. H. Lester, Watertown Arsenal, Watertown, Mass.	*J. H. Bly, United Aircraft Corp., East Hartford, Conn.
E-8 on Nomenclature and Definitions	P. V. Faragher, Aluminum Company of America, Pittsburgh, Pa.	R. E. Hess, American Society for Testing Materials, Philadelphia, Pa.
E-9 on Fatigue	*R. E. Peterson, Westinghouse Electric Corp., East Pittsburgh, Pa.	*O. J. Horger, The Timken Roller Bearing Co., Canton, Ohio.
E-11 on Quality Control of Materials	*Harold F. Dodge, Bell Telephone Laboratories, Inc., New York, N. Y.	*O. P. Beckwith, Alexander Smith & Sons Carpet Co., Yonkers, N. Y.

Los Angeles Meeting on October 29

JUST as this BULLETIN nears press we are advised of a meeting being arranged by the Southern California District to be held on Oct. 29 in the Roger Young Auditorium featuring two interesting topics: one, "A Steel Selection Chart for The Materials Engineer" to be presented by R. A. Schaus; and second, a discussion on "The Applications of Electrical Strain Gages to Static and Dynamic Testing," by G. A. Brewer. It is expected at this meeting also to present to R. C. Brumfield, of Caltech., the Templin Award, as noted earlier in this BULLETIN. The Committee extends a cordial invitation to all A.S.T.M. members and committee members, and their friends and associates to attend this meeting. The dinner is scheduled to begin at 6:30, followed by the technical program. Further information will be furnished all members in the Southern California District.

Volume on Underground Corrosion

INVESTIGATION of underground corrosion was begun by the National Bureau of Standards in 1922. From time to time reports of the results of this study have been published in the Bureau's *Journal of Research*. The work at the Bureau has been under the direction of Kirk H. Logan, Chief of the Underground Corrosion Section, and most of the reports have borne his name as the sole author or one of the authors.

These reports have been most useful to those interested in this subject, but by being scattered through issues of the *Journal* over a long period of years, it has not always been easy to have a complete set for ready reference. This has been particularly true when younger engineers have entered the field and have needed this material because some of the older issues were not available as individual reprints.

The essential data from all these reports have now been reassembled into a single bound volume which will be a definite and necessary addition to the library of any engineer interested in this subject. The volume is entitled "Underground Corrosion" (National Bureau of Standards Circular C450), and is for sale by the Superintendent of Documents, Washington 25 D. C., at a price of $1.25.

Gas Analysis and Testing of Gaseous Materials

Reviewed by G. W. Jones[1]

(A Contribution from Central Experiment Station, U. S. Bureau of Mines, Pittsburgh, Pa.)

THIS new book, "Gas Analysis and Testing of Gaseous Materials," by V. J. Altieri, Chief Chemist, Eastern Gas and Fuel Associates, Boston, Mass., gives a comprehensive review of American standards for sampling, analyzing, and testing gases and gas mixtures containing varying amounts of liquid and solid dispersoids. It is published by The American Gas Assn., Inc., 420 Lexington Ave., New York, N.Y., *$7.50 per copy.*

The book, comprising 567 pages and printed in quite small type, divides the subject matter into 20 chapters, with a rather complete name and subject index, an excellent bibliography of 197 references on the subjects discussed, 58 tables of data especially valuable to gas chemists, and 184 illustrations of marked value in enabling the procedures outlined to be easily understood and put into use. A table of four-place logarithms completes the book.

A review of the subjet matter includes the following:

Chapter 1.—Introduction. A theoretical discussion of the properties of gases and the nature, scope, and complexities of gas analysis. In this chapter consideration is given to stoichiometric, gas-volumetric, liquid-volumetric, gravimetric, and physical and physiochemical gas-analysis methods; the effect of temperature and pressure on gases; the kinetic theory of ideal and real gases; a discussion of various gas laws and their application to gas-analysis procedures, and the liquefaction and solubility of gases. The apparent purpose of this introductory chapter is to give the reader a preliminary background of the various factors involved in the gas-analysis procedures that follow.

Chapter 2.—The composition of gases. A partial list of the gaseous fuels discussed is as follows: acetylene; air-gas mixtures; blast-furnace gases; coal gas; combustion gases; gasoline; hydrogen; mixed gases; natural gas; oil gases; producer gas; reformed gases; water gas; and trade-name gases of some commercial importance. The subject matter is well-presented, with the exception of that of the compressed gases. A short, inadequate discussion is given of acetylene with respect to its explosive properties, but no mention is made as to how these hazards are affected by pressure and other factors. Since acetylene and other compressed gases are becoming increasingly important in various manufacturing processes, it would appear desirable in future editions to devote an entire chapter to the sampling and analysis of compressed gases. Table 4, "Composition of Typical Fuel Gases," will be found exceedingly useful to those interested in the composition of various gases.

Chapter 3.—Measurement of quantity and flow of gas. The subject matter is divided into positive displacement, hydrodynamic, and miscellaneous methods. Direct weighing, variable volume, aspirator, standard volume bottles, meter provers, wet and dry meters, venturi, orifice, and flow meters, Pitot tubes, anemometers, rotameters, bubble and dilution meters are presented; methods of use, and limitations of use are discussed.

Chapter 4.—Selection of methods of sampling. This chapter presents practical information to assist the novice and the initiated relative to the fundamentals and importance of correct sampling procedures. Details are presented to serve as a guide for selecting satisfactory methods of sampling various gas mixtures. Various displacement liquids employed in gas analysis and their limitations in the accurate sampling of mixtures under various conditions are discussed.

Chapter 5.—Apparatus and reagents. This chapter describes the various types of sampling equipment and gives recommended procedures for obtaining representative samples. The various reagents required for gas analysis, proper displacement liquids, and drying agents used in gas analysis are discussed. On page 96 the statement is made that electrolytic gas can be stored over water provided the water has been saturated with the gas. The reviewer insists that, for precise analysis, electrolytic gas should always be stored over mercury.

Chapter 6.—Common operations. The importance of a preliminary examination of the problem relative to the proper procedure required in the taking of samples, method of sampling (gas, liquid, and vacuum displacement), sampling under variable conditions of pressure, slow combustion and explosion methods of gas analysis, limits of inflammability of gases, gas detectors, miners' safety lamps, and other apparatus are discussed. This chapter is rather confusing to follow. Various diverse unrelated material is presented which could be incorporated, for the most part, in other chapters.

Chapter 7.—Calculations of gas analysis. This section discusses methods and formulas required to calculate the percentages of various individual combustible gases that may be present in complex mixtures.

In the final paragraphs of this chapter dealing with corrections for deviation of observed from theoretical molecular volume, the impression is given that these errors are in general unimportant. Errors of important magnitude will result when so-called "wet" natural gases and similar gases are analyzed unless corrections are made for deviations from those of ideal gases.

Chapter 8.—Official inspection and testing. The determination of hydrogen sulfide, total sulfur, ammonia, calculated and determined heating values, moisture, and dew point are discussed. The section dealing with heating values could be improved by expanding the discussion relative to calculated heating values, since many smaller organizations determine the heating values of gases by calculation. There is considerable confusion at present on what heating values should be assigned to the illuminants.

Chapter 9.—The Hempel type of apparatus and method. A complete description of the Hempel apparatus, modifications, and methods of use are given. This section is well presented and complete.

Chapter 10.—The Orsat and its modifications. The catalytic oxidation of methane and ethane is discussed, but in Table 13, page 89, catalytic oxidation is not given. Chemicals listed on page 184 should be given with the other chemicals in Chapter 5.

Chapter 11.—The Elliott and Morehead methods. The subject is well presented. In the descriptive matter, the term cu. cm. is used in some places, while in others the term ml. is used. To be consistent, one terminology should be followed.

Chapter 12.—The Shepherd apparatus and methods. The subject matter is well presented and complete. Preparation of chemicals should be transferred to Chapter 5.

Chapter 13.—Methods for small amounts of nitric oxide, carbon monoxide, olefines, oxygen, hydrogen, sulfide, cyanogen, hydrocyanic acid, etc. No comments.

Chapter 14.—Dusts, sprays, fumes, mists, and similar dispersoids. No comments.

Chapter 15.—Liquefaction and distillation methods of analysis. An excellent presentation of a difficult subject.

Chapter 16.—The determination of sulfur compounds. The determination of hydrogen sulfide, carbonyl sulfide, carbon disulfide, thiophene, mercaptans, and total sulfur. No comments.

Chapter 17.—Light oils in gas. This chapter discusses approved methods for the determination of benzene, toluene, xylene, light oils, and natural gasoline. No comments.

Chapter 18.—Naphthalene in gas. No comments.

Chapter 19.—Density and specific gravity. No comments.

Chapter 20.—Analysis of raw gases. No comments.

To summarize, the author has assembled for the first time in one publication information which heretofore has been widely scattered throughout the technical literature. The book contains a wealth of pertinent information coming outside the chapter headings given above. Because of the broad coverage of subjects and the fact that this is a first edition, some errors may have crept into the subject matter. However, the reviewer found no important errors.

As a minor criticism, the reviewer feels that the type is too small for the eyes of many who will scan its pages and that too much space has been given to some of the older types of gas-analysis apparatus and not enough space to types such as the Bone-Wheeler gas-analysis apparatus extensively used in Great Britain. There is considerable repetition of the same subject matter in different chapters; for example, chemical reagents used in gas analysis and analyses of certain constituents, such as hydrogen sulfide.

In conclusion, the reviewer regards this book as an excellent reference work on its particular subject—the most complete and comprehensive of its kind in print.

[1] Senior Chemist, Explosives Division, Central Experiment Station, Bureau of Mines, Pittsburgh, Pa. Published by permission of the Director, Bureau of Mines, United States Department of the Interior.

British Standard Methods for Testing Petroleum

THE 1946 edition of the Standard Methods for Testing Petroleum and Its Products issued by the British Institute of Petroleum includes new methods of procedure for estimating the percentage of sulfur present as carbon disulfide in petroleum, and for determining if coagulation of bitumen occurs on exposure of bituminous emulsion to low temperatures. In addition, the procedure for determining knock rating of aviation fuel, although essentially unaltered in principle, has been completely rewritten to bring it editorially more into line with the corresponding A.S.T.M. method.

The bromination method for determination of tetraethyl lead in gasoline has been extensively altered to shorten the time required for a determination, and warning is given that the method is not recommended for fuels containing a high percentage of unsaturated hydrocarbons.

An innovation this year is the inclusion of a list showing new methods, and methods and specifications which have been revised. The revised methods are listed in numerical order and details of the alterations to the methods are given.

More or less extensive amendments have been made to 21 of the methods, and to the hydrometer and thermometer specifications, while the conversion tables for petroleum oils have been withdrawn.

The Report of the Standardization Committee is now, in the main, confined to a discussion of work which has been proceeding during the year but which has not reached the stage where new methods or amendments to existing methods can be put forward.

This Seventh Edition, 550 pages, 150 illustrations, can be obtained from the Institute, 26 Portland Place, London W.1, and also from A.S.T.M. Headquarters, 1916 Race St., Philadelphia 3, Pa., at $3.25 per copy.

Bridge and Structure Volume

THE seventh volume issued by the International Association for Bridge and Structural Engineering which is the second publication during the current war includes 18 extensive papers by European authorities covering important structural problems involving not only iron and steel but other materials. A previously unknown and highly interesting report by L. Navier, famous French scientist, is included. This was written about 1826 and gives an interesting insight into his method of solving technical problems dealing with structures. The 396-page volume in heavy paper binding can be obtained from the publisher, A. G. Gebr., Leeman & Co., Stockerstrasse 64, Zürich 2, Switzerland, for 30 francs.

Chemical Dictionary

A VALUABLE reference book recently received is Hackh's Chemical Dictionary, the third edition of which was issued in 1944 by the Blakiston Co., 1012 Walnut St., Philadelphia 5, Pa. This latest edition, edited by Julius Grant, constitutes an encyclopedic work containing over 57,000 entries. Not only the terms used in general chemistry are covered, but also the collateral vocabularies of physics, astro-physics, geology, mineralogy, botany, zoology, medicine, pharmacy, and the pertinent terms of industry, mining and commerce. Care has been taken to balance the treatment of definitions from the American and British points of view. As in the second edition, the simplified spelling has been adopted as the preferred form; for example "sulfur" instead of "sulphur." This is in agreement with A.S.T.M. practice. This book has been brought thoroughly up to date in its coverage of newest developments in chemistry. It is a single volume of nearly 1000 pages ($6\frac{1}{2}$ by $9\frac{3}{8}$ in.), less than $1\frac{1}{2}$ in. thick, and bound for hard service. Copies of the book can be obtained from the publisher at $8.50.

A.S.T.M. Method Adopted as Standard Test Code by A.S.H.V.E.

AN IMPORTANT step in standardization and providing accurate and dependable values in the measurement of thermal conductivity of insulating materials has been taken in the adoption of the A.S.T.M. "Standard Method of Test for Thermal Conductivity of Materials by Means of the Guarded Hot Plate" (C 177) by the American Society of Heating and Ventilating Engineers. This method will be used as their standard test code, and in cooperation with the National Bureau of Standards, laboratories will be certified for testing thermal insulating materials using this method. The program as announced by the A.S.H.V.E. and covered in the July *Technical News Bulletin* of the Bureau includes sending a selected and tested specimen to a participating laboratory for test. After test the specimen will be returned to the A.S.H.V.E. Research Laboratory and then back to the National Bureau of Standards for check testing by which accredited laboratories will be held to certain acceptable tolerances.

The test method is a result of considerable effort and research on the part of a joint committee on thermal conductivity of all forms of insulation under Committee C-16. This group was sponsored by the American Society of Heating and Ventilating Engineers, American Society of Refrigerating Engineers, National Research Council, and the A.S.T.M.

Paper on General-Purpose Spectrographic Light Source

OF IMPORTANCE to spectrographic analysis at the present time is the British paper on "A General-Purpose Source Unit for the Spectrographic Analysis of Metals and Alloys" by A. Walsh, M.Sc.Tech. The author discusses very briefly the four main types of light sources used for spectrographic analysis, and then gives a detailed discussion of a general purpose light source which will cover a wide range of conditions and at the same time is simple and inexpensive. The paper includes a discussion of some applications of the general-purpose source unit. It is well illustrated and contains a large amount of supporting data from tests using this light source. The paper is available from British Non-Ferrous Metals Research Association, Euston Street, London, N.W.1; price two shillings and sixpence.

Conference on Acceptance Sampling

COMMENCING September 27 and continuing through eleven Friday afternoon and evening sessions a Conference on Acceptance Sampling is to be presented by the Special Courses Division of the Newark College of Engineering in Newark, N. J.

The announcement bulletin states:

"During the war considerable impetus was given to the use of Industrial Statistics when thousands of engineers obtained training in the techniques of Statistical Quality Control. It seems appropriate now, as production is being geared to competitive peacetime practices, that further systematic training in this field be provided for persons with such background. To meet this need Newark College of Engineering has planned a coordinated program in Industrial Statistics with present emphasis on Statistical Quality Control. The Fall Training Conference on Acceptance Sampling is the first project to be presented under this program."

The eleventh or final session on Friday, December 13, will be held jointly with the Society for Statistical Quality Control, the Newark affiliate of the American Society for Quality Control.

For the Conference the full-time staff consists of Professor Paul Clifford, Montclair State Teachers College, and Professors S. B. Littauer and O. J. Sizelove, of Newark College of Engineering. Special lecturers include Messrs. B. L. Clarke, H. F. Dodge, H. A. Freeman, G. R. Gause, Frederick Mosteller, Paul Peach, A. I. Peterson, W. A. Shewhart, and L. E. Simon. Further information can be obtained by writing to the Registrar, Newark College of Engineering, Special Courses Division, 367 High St., Newark 2, N. J.

Steel Committee Elects Honorary Members

HAVING just recently changed its Supplementary Regulations to establish a class of Honorary Membership, the Society's Committee A-1 on Steel at its meetings in Buffalo elected eleven men to Honorary Membership. Each of these men, an outstanding leader in his field, had for many years rendered distinguished service to the committee. Some of the men are still active in A-1, others have recently retired, and some have been in retirement for a number of years. The following list includes the name of the organization with which the individual was affiliated during the major years of work with the committee:

A. W. Carpenter, New York Central System
O. U. Cook, Tennessee Coal, Iron and Railroad Co.
L. H. Fry, Edgewater Steel Co., now Director, The Steam Locomotive Research Institute
W. C. Hamilton, American Steel Foundries
J. O. Leech, Carnegie-Illinois Steel Corp.
L. S. Marsh, Inland Steel Co.
C. F. W. Rys, Carnegie-Illinois Steel Corp.
J. J. Shuman, Jones & Laughlin Steel Corp.
F. N. Speller, National Tube Co.
F. M. Waring, Pennsylvania Railroad Co.
C. D. Young, Pennsylvania Railroad Co.

NRC Division of Engineering Appoints Jordan Secretary

DEAN Frederick M. Feiker, Chairman, Division of Engineering and Industrial Research of the National Research Council, announces the appointment of Louis Jordan as Executive Secretary of the Division. Mr. Jordan has recently been Executive Secretary of the War Metallurgy Committee and Head Technical Aide, War Metallurgy Division of NDRC.

Mr. Jordan was for many years a member of the staff of the metallurgical division of the National Bureau of Standards, directing research in chemical metallurgy, and in heat treatment and elevated temperature service of metals. He later served as Assistant Secretary of A.I.M.E. and as Executive Secretary of the Metals Division. Throughout World War II he was responsible for the administrative organization and operation of the War Metallurgy Committee.

Dean Feiker stated that this appointment of an experienced research administrator as Executive Secretary of the Division is in line with the plans of the National Research Council to augment the permanent staff of its technical divisions so as to be better able to continue, in the postwar era, the leading part the Council has played during World War II in organizing and coordinating research activities of interest to governmental, industrial, and educational institutions.

Tire Wear and Cost

THE factors which directly affect tire wear and cost have been determined from the results of 450,000 mi. of carefully controlled driving on gravel and bituminous surfaces and concrete pavements in Iowa, Kansas, Missouri, and Wyoming and are reported by Moyer and Tesdall in Bulletin 161 of the Iowa Engineering Experiment Station, "Tire Wear and Cost on Selected Roadway Surfaces."

This study of tire wear and cost is part of a general investigation of the effects of roadway surfaces on the costs of automobile operation, carried out from 1938 to 1942 in cooperation with the Public Roads Administration and requiring detailed observations with eight cars driven at speeds ranging from 25 to 65 m.p.h.

The results show that tire wear is influenced directly by 15 factors, the most important being car speed, roadway surface, and driving and maintenance habits of the operator, and that 12 factors, most of which are avoidable, contribute directly to tire carcass failure. The average rate of tire wear observed on concrete pavements and bituminous surfaces indicates that, with due attention to tire maintenance, a life of 56,500 mi. may be expected if speed does not exceed 35 m.p.h., whereas at 65 m. p. h. the life expectancy is only 18,700 mi. In the road trials the average life of ten tires operated on concrete pavements was 36,650 mi.; that of twenty tires on gravel surfaces was 23,160 mi., many of these tires being retired because of carcass failures before the treads were worn smooth. Also, there were 98 punctures in 132,000 mi. of travel on gravel surfaces, as compared to a single puncture in an equal distance on concrete pavements, and one puncture in 72,000 mi. on bituminous surfaces.

The records show: that tire wear on curves at speeds which cause the tires to "scream" is more than ten times the wear at speeds which do not result in sidewise skidding; that the tire costs in "stop-and-go" driving on concrete pavements are slightly more than three times the corresponding costs for average country driving and that many thousands of car-miles of tire use are lost through avoidable carcass failures.

Single copies of this 128-page bulletin may be obtained without charge from the Engineering Experiment Station, Iowa State College, Ames, Iowa.

Standard Code for Arc and Gas Welding in Building Construction

A 1946 edition of the Standard Code for Arc and Gas Welding in Building Construction has just been published to replace the 1941 (tentative) edition. This Code in its earlier editions has been widely adopted by municipalities for the administration of welded construction under their jurisdiction. The new edition embodies revisions based on experience in the recent applications of welding to structural fabrication and on further research investigation.

The section on design now provides for increased allowable weld unit stresses equal to those allowed for the steel being welded. Other sections on filler metal, workmanship, inspection and qualification of welding operators and procedures have also been revised.

Copies of this 68-page publication may be obtained from the American Welding Society, 33 West 39th Street, New York 18, N. Y., at 50c per copy.

Corps of Engineers Concrete Laboratory Shifted

THE Central Concrete Laboratory of the North Atlantic Division, Corps of Engineers, U. S. Army, formerly at Mount Vernon, New York, was deactivated during June, 1946, and the key personnel and equipment were transferred to Clinton, Mississippi, where a new laboratory is to be created as a division of the U. S. Waterways Experiment Station, Vicksburg, Miss. The new laboratory known as the Concrete Research Division of the U. S. Waterways Experiment Station is to be headed by Charles E. Wuerpel, who was Engineer in Charge of the Central Concrete Laboratory. The purpose of the new laboratory is to perform all research work on cement, concrete, and materials related to concrete construction which are required by the U. S. Engineer Department. A further purpose of the laboratory is to provide adequate facilities for the investigation of problems related to concrete to be placed in specific structures by the U. S. Engineer Department throughout the United States.

The U. S. Waterways Experiment Station now consists of a major Hydraulics Laboratory and a major Soils Laboratory as well as a Research Center whose purpose it is to coordinate all research activities of the U. S. Engineer Department.

New Members to July 20, 1946

The following 165 members were elected from May 6 to July 20, 1946, making the total membership 6006,

Names are arranged alphabetically—company members first, then individuals.

Chicago District

Henry Valve Co., Inc., D. K. McIlvaine, Chief Engineer, 3260 W. Grand Ave., Chicago 51, Ill.

Liquid Carbonic Corp., The, M. J. Smolek, Chief Inspector, 3100 S. Kedzie Ave., Chicago 23, Ill.

Universal Castings Corp., G. J. Foss, Chief Metallurgist, 5821 W. Sixty-sixth St., Chicago 38, Ill.

Wilson Athletic Goods Manufacturing Co., Inc., J. G. Havey, Chief Chemist, Chicago 47, Ill.

Cameron, Donald G., Chief Engineer, Penn Electric Switch Co., Goshen, Ind.

Cochrane, T. Harry, Owner, T. Harry Cochrane Laboratories, 729 S. Sixteenth St., Milwaukee 4, Wis.

Goldman, Meyer, Research Chemist, The Visking Corp., 6733 W. Sixty-fifth St., Chicago 38, Ill.

Rubinate, Frank J., Technologist, QM Food and Container Inst., 1849 W. Pershing Rd., Chicago, Ill. For mail: 1400 E. Fifty-third St., Chicago 15, Ill.

Scherer, Andrew C., Records Administrator, U. S. Army, Chicago Ordnance District, 38 S. Dearborn St., Chicago, Ill. For mail: 1705 Ridge Ave., Evanston, Ill.

Simpson, J. M., President, A. M. Castle and Co., 1132 W. Blackhawk St., Chicago 22, Ill.

Skeates, Fred B., Superintendent of Foundries, Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

Wilson, Warren E., Director of Research and Engineering, Greens Ready Built Homes, Inc., 1221 Eighteenth Ave., Rockford, Ill.

Cleveland District

Killian Manufacturing Co., The, H. B. Morris, Technical Director, 355 Morgan Ave., Akron 11, Ohio.

Jannetto, Nicholas A., Superintendent, Metal Control, Monarch Aluminum Manufacturing Co., 9301 Detroit Ave., Cleveland, Ohio. For mail: 18105 Hiller Ave., Cleveland 19, Ohio.

Lotz, Richard K., Associate Editor, *Machine Design Magazine*, Penton Bldg., Cleveland 13, Ohio.

Peskin, Jerome R., Editor, *Die Casting Magazine*, 1240 Ontario St., Cleveland 13, Ohio.

Seidler, A. W., Head of Works Laboratory, National Carbon Co., Inc., Box 6087, Cleveland, Ohio. For mail: 15109 Braemer Dr., Cleveland 11, Ohio.

Willey, A. O., Director of Engineering, The Lubrizol Corp., Box 3057, Euclid Station, Cleveland 17, Ohio.

Detroit District

Greene, Paul G., Co-partner, Johnson-Greene Co., 616 Ann Arbor Trust Bldg., Ann Arbor, Mich.

Lumley, Charles Swain, Manager, Industrial Div., Smith, Hichman & Grylls, Inc., 666 Penobscot Bldg., Detroit 26, Mich.

Meier, Robert J., Partner, Meier Brass and Copper Co., 1320 E. Larned, Detroit 7, Mich.

Monaweck, Jay H., Chemical Engineer, Chrysler Corp., 461 Engineering Division, Box 1919, Detroit 31, Mich. For mail: 32 Pasadena Ave., Detroit 3, Mich.

Sharp, Donald E., Assistant Director of Research, Libbey-Owens-Ford Glass Co., 1701 E. Broadway, Toledo 5, Ohio.

Toulouse, Julian Harrison, Chief Engineer, Quality and Specifications Section, Owens-Illinois Glass Co., Ohio Bank Bldg., Toledo, Ohio. For mail: 1817 Potomac Dr., Toledo 7, Ohio.

New York District

Carpenter Steel Co., The, J. A. Deitrich, Metallurgical Engineer, Welded Alloy Tube Div., Kenilworth, N. J.

Concordia-Gallia Corp., Charles H. Ochsner, Textile Technician, 1400 Broadway, New York 18, N. Y. [S]*

Crocker-Wheeler Electric Manufacturing Co., Division of Joshua Hendy Iron Works, I. C. Smith, Chief Engineer, Ampere, N. J.

Dentists' Supply Company of New York, The, F. M. Lott, Director of Professional Research, 220 W. Forty-second St., New York 18, N. Y.

Tickle Engineering Works, Inc., Arthur, Archibald Watt, Metallurgist, 21 Delevan St., Brooklyn 31, N. Y.

Ainslie, Thomas D., Chemist, Phillips Jones Corp., E. 134th St. and Walnut Ave., New York, N. Y. For mail: Box 466, Metuchen, N. J.

Bemmels, C. W., Research Chemist, Industrial Tape Corp., New Brunswick, N. J.

Berger, Arthur N., Consulting Engineer, Post Office Box 217, Port Jefferson Station, New York, N. Y.

Braidech, Mathew M., Director of Research, National Board of Fire Underwriters, 85 John St., New York 7, N. Y.

Brassell, Allen L., Vice-President, United States Testing Co., Inc., 1415 Park Ave., Hoboken, N. J.

Clarke, B. L., Director of Chemical Control, Merck and Co., Inc., Rahway, N. J.

Cooper, Howard, Chief Lubrication Engineer, Sinclair Refining Co., 630 Fifth Ave., New York 20, N. Y.

Dalzell, C. L., Consulting Engineer, Bendler & Dalzell, 233 Broadway, New York 7, N. Y.

Dippel, Harry W., Chief Chemist, Stillwell & Gladding, 130 Cedar St., New York 6, N. Y.

Fang, Joseph P. Y., Research Chemist, Chinese National Bureau of Industrial Research, China. For mail: 548 Springfield Ave., Summit, N. J.

Fowler, Franklin H., Jr., Engineer, Curtiss Wright Corp., Propeller Division, Caldwell, N. J. For mail: 81 Midland Ave., Montclair, N. J.

Gunn, William T., Director, Division of Refining, American Petroleum Inst., 50 W. Fiftieth St., New York 20, N. Y.

India Rubber World, R. G. Seaman, Editor, 386 Fourth Ave., New York 16, N. Y.

Klaas, Werner, Owner, Testfabrics, 1243 Lenox Ave., Plainfield, N. J.

Lain, George D., Research Engineer, American Iron and Steel Inst., 350 Fifth Ave., New York 1, N. Y.

Lienhard, Frederick, Consulting Engineer, 99 Wall St., New York 5, N. Y.

Mikhalapov, George S., Manager, Apparatus Research Dept., Air Reduction Sales Co., 181 Pacific Ave., Jersey City 4, N. J.

Milligan, William E., Associate Professor of Metallurgy, Yale University, Hammond Metallurgical Laboratory, 14 Mansfield St., New Haven 11, Conn.

Rose, William A., Partner, Rose & Rose, 116 John St., New York 7, N. Y.

Rubber Age, The, M. E. Lerner, Editor, 250 W. Fifty-seventh St., New York 19, N. Y.

Sawyer, Charles H., Research Engineer, Eastern Gas and Fuel Associates, Koppers Coal Division, Koppers Bldg., Pittsburgh 19, Pa.

Silverman, Alan W., Laboratory Technician, Cantor-Greenspan Co., Inc., 469 Seventh Ave., New York, N. Y. [J]†

Sylvester, Walter G., Director of Chemical and Metallurgical Research, Walter Kidde and Co., 675 Main St., Belleville 9 N. J.

Wehmer, Paul F., Chief Chemist, Electrical Testing Labs., Inc., East End Ave. at Seventy-ninth St., New York 21, N. Y. For mail: 155 Crestwood Ave., Tuckahoe P. O. 7, N. Y.

Wolsdorf, Henry A., Vice-President, Stapling Machines Co., 78 Ogden Ave., Rockaway, N. J.

Northern California District

Fuller and Co., W. P., L. A. O'Leary, Head of Chemical Engineering and Research Dept., South San Francisco, Calif.

Davidson, S. Leonard, Chief Chemist, National Lead Co., Pacific Coast Branch, 2240 Twenty-fourth St., San Francisco 10, Calif.

Philadelphia District

Beemer Engineering Co., Frank Beemer, Partner, 401 N. Broad St., Philadelphia 8, Pa.

Lawrie, Ritchie, Jr., Co-partner, Lawrie & Green, 321 N. Front St., Harrisburg, Pa.

Sawyer, Roscoe H., Research Supervisor, E. I. du Pont de Nemours and Co., Newport, Del.

Stephens, Robert A., Chief Research Chemist, C. K. Williams and Co., 640 N. Thirteenth St., Easton, Pa.

Young, H. Russell, Chief Engineer of Testing Machines, Baldwin Locomotive Works, Eddystone, Pa. For mail: 616 Braeburn Lane, Narberth P. O., Pa.

Pittsburgh District

Anderson, Orville E., Engineer, Westinghouse Electric Corp., Micarta Works, Trafford, Pa.

Faris, Frederic, Architect, 1117 Chapline St., Wheeling, W. Va.

Jones, Lawrence K., Manager Special Test Section, Pittsburgh Testing Laboratory, 1330 Locust St., Pittsburgh 19, Pa.

Jonnard, A., Industrial Fellow, Mellon Institute of Industrial Research, Pittsburgh 13, Pa.

Kent, C. L., Metallurgical Engineer, Jones & Laughlin Steel Corp., Pittsburgh 30, Pa.

Pitzer, L. E., Chemical Engineer, Carnegie-Illinois Steel Corp., 434 Fifth Ave., Pittsburgh 30, Pa.

Richardson, George S., Consulting Engineer, 1420 Park Bldg., Pittsburgh 22, Pa.

Rosenbloom, Harold I., Chemist, Reliance Steel Products Co., 3700 Walnut St., McKeesport, Pa.

Schoolberg, Henry, Public Accountant, Box 17, Gibsonia, Pa.

Townsend, Lewis F., Construction Engineer, Westinghouse Air Brake Co., Dept. G, Wilmerding, Pa.

Wilson, Thomas A., Senior Fellow, Mellon Institute of Industrial Research, 4400 Fifth Ave., Pittsburgh 13, Pa.

St. Louis District

Brown Co., The R. J., E. L. Metcalf, Technical Director, 1418 Wittenberg Ave., St. Louis 10, Mo.

Eyermann, Louis Max, II, Adjudicator, Dependents Claims Service, U. S. Veterans Administration, Branch No. 9, 314 N. Broadway, St. Louis 2, Mo. For mail: Box 2521, Merchants Station, St. Louis 2, Mo.

Southern California District

Olds Alloys Co., Russell B. Olds, President, 4481 Mason St. South Gate, Calif.

Page Testing Laboratory, E. C. Page, Owner, Box 461, Ventura, Calif.

Behrens, Fred B., Manager of Manufacturing, Wilshire Oil Co., Inc., 1206 Maple Ave., Los Angeles 15, Calif.

Coberly, C. J., President, Kobe, Inc., 3040 E. Slauson Ave., Huntington Park, Calif.

Harris, H. E., Director, Products Development Lab., North American Aviation, Inglewood, Calif.

Jeffers, T. H., Chief Engineer, Grayson Heat Control Ltd., 3000 E. Imperial Highway, Lynwood, Calif.

Semion, Walter A., Engineer, Rainbow Chemico Paint Co., 1637 Malcolm Ave., Los Angeles 24, Calif.

University of California, Engineering Library, 405 Hilgard Ave., Los Angeles 24, Calif.

Western New York-Ontario District

Canada Wire and Cable Co., Ltd., Frank Ashworth, Box 340, Toronto 1, Ont., Canada.

Andrus, Kenneth B., Technical Service Representative, Corning Glass Works, Corning, N. Y.

Dickerson, Julian D., Chief Metallurgist,

Republic Steel Corp., 1175 S. Park Ave., Buffalo 5, N. Y.

LORENCE, EUGENE E., Chemist, The Linde Air Products Co., Tonawanda, N. Y. For mail: 1797 Clinton St., Buffalo 6, N. Y. [J]

PARCHÉ, WILLIAM HENRY, Lubrication and Bearing Engineer, The Carborundum Co., Niagara Falls, N. Y. For mail: 722 Park Place, Niagara Falls, N. Y.

WILLIHNGANZ, EUGENE, Director of Research, National Battery Co., 35 Neoga St., Depew, N. Y.

U. S. and Possessions

COLLINS RADIO CO., W. H. Kohl, Research Engineer, 855 Thirty-fifth St., N. E., Cedar Rapids, Iowa.

CONSOLIDATED VULTEE AIRCRAFT CORP., J. E. Arnold, Chief Test Engineer, Lone Star Laboratory, Daingerfield, Tex.

CRAM & FERGUSON, William H. Owens, Partner, 248 Boylston St., Boston 16, Mass.

CURTISS-WRIGHT CORP., AIRPLANE DIVISION, F. A. Wedberg, Section Head Materials Laboratory, Columbus 16, Ohio.

KNOX GLASS ASSOCIATES, INC., Richard Yount, Head, Central Laboratory and Research Division, Knox, Pa.

MACKENZIE, INC., L. R., 625 S. W. Ninth St., Des Moines, Iowa.

OSHKOSH INDUSTRIAL LABORATORY, John O. Frank, 57 W. New York Ave., Oshkosh, Wis.

SCHENLEY DISTILLERIES, INC., Walter T. Bagel, Material Tester Engineer, 26 E. Sixth St., Cincinnati 2, Ohio.

SOUTH DAKOTA CEMENT PLANT, THE, Frank Gardner, Production Manager, Drawer 351, Rapid City, S. Dak.

ADAMS, ROBERT C., Principal Chemical Engineer, U. S. Naval Engineering Experiment Station, Annapolis, Md.

ADAMS, THOMAS C., Consultant, 525 Utah Oil Bldg., Salt Lake City 1, Utah.

BERTHOLF, WILLIAM M., Efficiency Engineer, By-Product Coke Plant, Colorado Fuel and Iron Corp., 930 E. Twelfth St., Pueblo, Colo.

BITUMINOUS COAL PRODUCERS ADVISORY BOARD FOR DISTRICT NO. 8, H. Stevens, Technical Adviser, Transportation Bldg., Cincinnati 2, Ohio.

CHEYNEY, LA VERNE E., Research Engineer, Battelle Memorial Institute, Columbus 1, Ohio.

CLEMSON AGRICULTURAL COLLEGE, SCHOOL OF TEXTILES, Hugh M. Brown, Dean, Clemson, S. C.

CLOUGH, LYLE A., Technical Director, Virginia Rubatex Division, Great American Industries, Bedford, Va.

CROSS, E. E., Metallurgist, Colt's Patent Fire Arms Manufacturing Co., Hartford, Conn. For mail: 100 Main St., Unionville, Conn.

DANTSIZEN, C., Engineer, Schenectady Works, General Electric Co., 1 River Rd., Schenectady 5, N. Y.

DOUGHTY, RANDALL H., Research Director, Fitchburg Paper Co., Fitchburg, Mass.

ELDRIDGE, FRANK R., JR., Physicist, Jones & Lamson Machine Co., Springfield, Vt.

EVERHART, ECCLES DEWEY, Partner, Voorhees & Everhart, 514 Wachovia Bank Bldg., High Point, N. C.

HALL, KENNETH S., Paving Consultant, Portland Gas and Coke Co., Portland, Ore. For mail: 1927 S. W. Main St., Portland 5, Ore.

HARNDEN, GEORGE H., Specifications Engineer, Standards Division, Executive Department, General Electric Co., Schenectady 5, N. Y.

HEATH, CHARLES O., JR., Assistant Professor, Oregon State, 206 Engineering Bldg., Corvallis, Ore.

HUNTER, RICHARD S., Physicist, Henry A. Gardner Laboratory, 4723 Elm St., Bethesda 14, Md.

HUNTER, WALKER C., Chief Chemist, Avondale Mills, Sylacauga, Ala.

HUSSEY, E. E., Standards Engineer, Raytheon Manufacturing Co., Waltham 54, Mass. For mail: 12 Cleaves St., Wollaston 70, Mass.

KISSEL, M. M., Supervisor, Engineering Lab., The North Electric Manufacturing Co., 501 S. Market St., Galion, Ohio.

LINDA HALL LIBRARY, 5109 Cherry St., Kansas City 4, Mo.

MANSFIELD, R. H., Assistant to Vice-President, American Creosoting Co., 401 W. Main St., Louisville 2, Ky.

McDONELL, HUBERT F., Head of Physical Lab., Division of Tests, State Road Dept., Gainesville, Fla.

NESMITH, O. E., Director of Engineering and Research, Eureka Williams Corp., Bloomington, Ill.

NOECKER, DUANE S., Metallurgist, Gale Products, Galesburg, Ill.

OBERLY, LOUIS A., Director of Research, Hartford Rayon Corp., Rocky Hill, Conn.

OSBOURNE, ALAN, Chief of Research Section, Technical Div., U. S. Maritime Commission, Commerce Bldg., Washington 25, D. C.

PAI, VISHWANATH NARAYAN, Chief Chemist, The Associate Cement Co., Ltd., Bombay, India. For mail: 1802 Kenyon St., N. W., Washington 10, D. C.

PRICE, WALTER H., Materials Engineer, U. S. Bureau of Reclamation, Denver 2, Colo.

RAHN, GEORGE A., Engineer of Materials and Construction, Highway Research Board, 2101 Constitution Ave., Washington 25, D. C.

RICHARDS, T. L., Sales Manager, Riehle Testing Machine Division, American Machines and Metals, Inc., East Moline, Ill.

SEDGWICK, CHARLES F. E., Quality Control Coordinator, The Esmond Mills, Inc., Esmond, R. I.

SMITH, RAYMOND B., Metallurgist, Reynolds Metals Co., 2500 S. Third St., Louisville 1, Ky.

SMITH, T. R., Research Engineer, The Maytag Co., Newton, Iowa.

STANLEY, CASSIUS M., JR., Salesand Development, Avondale Mills, Sylacauga, Ala.

SYMONS, RALPH B., Consulting Engineer, Main Rd., Tiverton, R. I.

THOMASSON, RAYMOND F., Junior Chemist, U. S. Rubber Co., 549 E. Georgia St., Indianapolis, Ind. For mail: 110 Roane St., Charleston 2, W. Va.

TOLSON, O. T., Physical Testing Engineer, Texas Testing Laboratories, Inc., 1416 Young St., Dallas 1, Tex.

UNIVERSITY OF TULSA, ENGINEERING DEPARTMENT, R. L. Langenheim, Dean of Engineering, Tulsa 4, Okla.

VAALER, ADRIAN W., Consultant, Civil Engineering, 861 Willamette St., Eugene, Ore.

VAURIO, FRANS V. E., Research Assistant, The Institute of Paper Chemistry, Appleton, Wis.

WEEBER, EARL R., Consulting Engineer, Hamilton & Weeber, 356 Houseman Bldg., Grand Rapids 2, Mich.

WHEELER, WALTER H., Professional Engineer, 802 Metropolitan Life Bldg., Minneapolis 1, Minn.

YATES, JASON CLIFFORD, Assistant Materials Engineer, National Bureau of Standards, Connecticut Ave. and Van Ness St., N. W., Washington, D. C. For mail: 3409 Newark St., N. W., Washington 16, D. C.

ZAPFFE, CARL A., Consulting Metallurgist, 6410 Murray Hill Rd., Baltimore 12, Md.

Other than U. S. Possessions

COMMONWEALTH AIRCRAFT CORP., PTY., LTD., Box 779 H., P. O. Elizabeth St., Melbourne, Victoria, Australia.

FERROCARRIL CENTRAL ARGENTINO, DEPTO. ING., Jefe Mecánico, Talleres, Rosario, Argentina.

HUSQVARNA VAPENFABRIKS, A. B., Bengt Magnusson, Director of Research, Huskvarna, Sweden.

POLYMER CORPORATION LIMITED, N. R. Legge, Research Chemist, Sarnia, Ont., Canada.

SOCIEDAD FINANCIERA DE INDUSTRIAS Y TRANSPORTES, Ignacio Ventosa, Managing Director, Via Layetana 26, Barcelona, Spain.

SOSA TEXCOCO S. A., D. de Pelsmaeker, General Manager, Isabel la Católica No. 45–105, Mexico, D. F., Mexico.

TÉCNICA INDUSTRIAL, S. A., Cornelio Miechielsen, Mining and Civil Engineer, Apartado Postal No. 755, Monterrey, N. L., Mexico.

TRANS-CANADA AIRLINES, Paul E. Lamoureux, Materials and Processes Engineer, Box 2973, Winnipeg, Man., Canada.

DE MEULEMEESTER, DÉSIRÉ, Directeur du Laboratoire de Textiles à l'Universitaire de Gand, St. Pietersnieuwstraat 57, Ghent, Belgium.

DONNELLY, VICTOR JOHN, Chief Metallurgist, Acton Bolt, Ltd., 26 Chase Rd., London, N. W. 10, England.

DUTRON, R., Directeur, Laboratoire de Recherches et de Controle Fabricants de ciment Portland, 127 Avenue Ad. Buyl, Bruxelles, Belgium. For mail: 80 Boulevard L. Schmidt, Brussels, Belgium.

FERNANDEZ-LADREDA, JOSÉ MARIA, Engineer and Secretary, Ministro de Obras Públicas, Madrid, Spain.

FERREE, JOHN R., Superintendent, Sherwin Williams, Argentina, S. A., Corrientes 222, Buenos Aires, Argentina, S. A.

FORESTIER, E. T., Chartered Civil Engineer and Standardization Consultant, 5 Lawrie Park Gardens, Sydenham, London S. E. 26, England.

GONZALEZ POMARES, EVELIO J., Dr. en Ciencias Físico-Químicas, Ministerio de Obras Públicas, Calle Luz entre Cuba y Habana. For mail: Calle C. No. 459, Vedado, Habana, Cuba. [J]

KHOUZAM, ALBERT FOUAD, Assistant Engineer of Electrical Service, The Cairo Tramways Co., Steel Works, 1 Maspero St., Cairo, Egypt.

KJELLBERG, BJÖRN O., Engineer, Elektriska Svetsnings A. B., Gothenburg, Sweden.

LIANDER, HALVARD, Manager of Materials Laboratory, Allmänna Svenska Elektriska AB, Västerås, Sweden. For mail: Källgatan 11 A, Västerås, Sweden.

LIN, WEN PIAO, President, Pooli Rubber Industry Co., Szechwan, China.

POLLET, HENRY, Dean, College of Engineering, Kung Shang University, Race Course Rd., Tientsin, China.

SOUTH AFRICAN BUREAU OF STANDARDS, Private Bag 191, Pretoria, South Africa.

TAYLOR, DANIEL BRUMHALL COCHRANE, Research Student, 47 Elaine St., Stranmillis, Belfast, Northern Ireland. [J]

THERIAULT, CLIFFORD H., 405 Metcalfe Ave., Westmount, Montreal, Canada.

TORRE, PIER LUIGI, Engineer, "Innocenti," Via Pitteri 81, Milano, Italy.

* [S] Denotes Sustaining Member.
† [J] Denotes Junior Member.

Personals . . .

. . . News items concerning the activities of our members will be welcomed for inclusion in this column.

SAMUEL O. SORENSEN, Chemist, Archer-Daniels-Midland Co., Minneapolis, Minn., was elected President of the American Oil Chemists' Society at the annual meeting of this society held in New Orleans in May.

C. R. INCE, formerly Assistant Sales Manager, St. Joseph Lead Co., New York, N. Y., has been promoted to Manager of Metal Sales of the same company.

HARRY E. OUTCAULT is now Assistant Sales Manager of the Zinc Oxide Department, St. Joseph Lead Co., New York, N. Y. He was formerly engaged in technical sales service work with St. Joseph Lead.

At the annual meeting of Bituminous Coal Research, Inc., HOWARD N. EAVENSON, President, Clover Splint Coal Co., Pittsburgh, Pa., was reelected President of this group.

J. W. E. HARRISSON, Partner, La Wall and Harrisson, Philadelphia, Pa.,

received the honorary degree of Doctor of Science at the one hundred and twenty-fifth commencement of the Philadelphia College of Pharmacy and Science.

The Navy Department's Distinguished Civilian Service Award has recently been presented to DONALD L. COLWELL, Chicago District Manager, The National Smelting Co., Chicago, Ill., in recognition of his outstanding achievement while serving as Chief of the Conservation Division of the Production Branch, Office of Procurement and Material.

FOSTER DEE SNELL, President, Foster D. Snell, Inc., Brooklyn, N. Y., was elected President of the American Institute of Chemists at its annual meeting, succeeding GUSTAV EGLOFF, Petroleum Technologist, Universal Oil Products Co., Chicago, Ill. JOSEPH MATTIELLO, Technical Director, Hilo Varnish Corp., Brooklyn, N. Y., was elected Vice-President, succeeding DONALD PRICE, Technical Director, Oakite Products, Inc., New York, N. Y.

H. J. HUESTER, Lieutenant Commander, U. S. Naval Reserve, Wright Field, Dayton, O., has returned from a mission to the Equator and Pacific Area which studied the prevalent causes of deterioration to Air Forces, Quartermaster and Signal Corps equipment in tropical regions.

C. A. WILLSON who was formerly Chief, Clay and Concrete Products Section, Building Materials Div., War Production Board, Washington, D. C., is now Chief, Building Codes Div., Technical Research Branch, National Housing Agency, Washington 25, D. C.

IRWIN H. SUCH is now Editor of *Steel*, Cleveland, O. He was formerly Engineering Editor of this magazine.

J. D. HANAWALT has been appointed General Manager of Dow Chemical Company's recently consolidated magnesium sales, fabrication, and technical divisions in Midland, Mich. He was formerly Director, Metallurgical Laboratory with the same company.

WILLIAM A. SCHEUCH, formerly Vice-President, Nassau Smelting & Refining Co., Tottenville, Staten Island, N. Y., has been elected President of the company.

C. E. BATES, Vice-President, Ironton Fire Brick Co., Ironton, O., has been appointed to the labor-management relations committee, National Association of Manufacturers.

S. C. HOLLISTER, Dean, College of Engineering, Cornell University, Ithaca, N. Y., is now a Vice-President of the University in which capacity he will be in charge of university development. Dean Hollister will continue as Head of the College of Engineering.

MURRAY F. SKINKER, formerly with the Federal Telephone and Radio Corp., East Newark, N. J., has opened his own office as Personnel and Research Consultant at 225 Lafayette Street, New York, N. Y. Dr. Skinker has spent twenty years in administration, engineering and research work and fifteen years selecting and training men.

L. B. HUTCHINSON is now Head of Experimental Structures Section, Structures Branch, Bureau of Aeronautics, Navy Dept., Washington, D. C. He was formerly Assistant Chief Engineer, Design Dept., Elco Naval Division, Electric Boat Co., Bayonne, N. J.

DONALD J. DOAN, who has served in the Army since December, 1942, has turned to The Eagle-Picher Co. as Research Metallurgist, Metallic Products Division, Cincinnati, O.

After three years of service with the U. S. Navy, DOUGLAS E. AGREN has returned to civilian status. He is located in Detroit, Mich.

HARRY McCARTHY retired on December 31, 1945, from the Walworth Co. as Assistant Chief Engineer, Kewanee Works, Kewanee, Ill.

DONALD WOOD, formerly Research and Methods Engineer, National Silver Co., Brooklyn, N. Y. is now operating his own business, the Hill Cross Co., Brooklyn, N. Y., which will specialize in contract electroplating or stripping of precious metals where unusual facilities of controls are required. Contract stripping is a new type of service, apparently warranted by the large aggregate of precious metals appearing as coatings on surplus and scrap materials.

CHARLES A. LUNN is now residing in Norwalk, Conn. He has retired from his position of Process Engineer with the Consolidated Edison Co. of New York, Inc.

ROBERT L. WINNICK is returning as Test Supervisor to his former connection with the Inspector of Naval Material, Newark, N. J. He has been discharged from the Navy where he was attached to Amphibious Group 7 and saw service in Okinawa and China.

CHARLES B. FRANCIS will practice as a Consulting Chemical and Metallurgical Engineer in Pittsburgh, Pa. He has retired from his position as Chemist and Metallurgist, Carnegie-Illinois Steel Corp., Pittsburgh, Pa. after many years of service. One of his notable recent accomplishments was rewriting the Fifth Edition (1940) of the monumental work "The Making, Shaping and Treating of Steel." His Pittsburgh address is 815 Bellaire Ave.

J. F. FIRTH-HAND who was formerly a Chartered Civil Engineer, British Colonies Supply Mission, Washington, D. C., is now associated with Firth-Hand, Stewart and Co., Civil and Mechanical Engineers, Washington, D. C.

JEAN H. KNOX, formerly Chief Engineer, Byrne Organization, Washington, D. C., is now Consulting Engineer, Floridegold Citrus Corp., Winter Haven, Fla.

DYKE WILSON has retired from active service with Laclede Gas Light Co. after having served as Chief Chemist for many years.

J. J. ALLINSON is now Vice-President, Charge of Petroleum, Refining and Heavy Chemical Div., J. A. Jones Construction Co., Inc., Houston, Tex. He was formerly Vice-President in Charge of Manufacturing, Lion Oil Co., El Dorado, Ark.

JOHN A. SWIFT who was formerly Chief Metallurgist, The Billings & Spencer Co., Hartford, Conn., is now Metallurgical Engineer and New England Representative, Heatbath Corp., Springfield, Mass.

RICHARD STERN, Assistant Manager, Shell Oil Co., Inc., New York, N. Y., has retired from active service in this capacity.

EDWIN JOYCE, formerly Administrator, National Emergency Steel Specifications, War Production Board, Washington, D. C., is now with the Division of Production, American Petroleum Institute, Dallas, Tex.

DONALD R. MACPHERSON is now Director of Research and Development, The Techkote Co., Inglewood, Calif. He was formerly Acting Director of Research, Master Builders Research Laboratories, Cleveland, O.

RICHARD C. BOSTWICK who has been serving as a Lieutenant in the U.S.-N.R. is now Assistant to Production Manager, Bond Crown and Cork Co., Wilmington, Del.

S. A. MONTANARO, formerly Test Engineer and Metallurgist, New York Testing Laboratories, New York, N. Y., is now Materials Engineer, American District Telegraph Co., New York, N. Y.

J. C. ROBINSON, who was formerly Chemical Engineer, The Phosphate Mining Co., New York, N. Y., is now Production Chief, Tennessee Eastman Corp., Oak Ridge, Tenn.

W. V. BAUER is now Project Engineer, Onyx Oil & Chemical Co., Jersey City, N. J. He was formerly Chemical Engineer, Hydrocarbon Research, Inc., New York, N. Y.

A. L. JOHNSTONE, formerly Chief Chemist, Consumers Cooperative Association, North Kansas City, Mo., is now Senior Testing Engineer, Kansas City Public Works Testing Laboratory, Kansas City, Mo.

P. E. KYLE, who was formerly Associate Professor of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, Mass., is now Professor of Applied Metallurgy, Cornell University, Ithaca, N. Y.

E. S. HODGE, formerly Spectrographer, Harry W. Dietert Co., Detroit, Mich., is now Consulting Spectrographer, Applied Research Laboratories, Detroit, Mich.

H. A. SLEACO, who was formerly Engineer, Inspection Board of United Kingdom and Canada, Ottawa, Ontario, Canada, is now Engineer, The Foundation Company of Canada, Montreal, Quebec, Canada.

THOMAS REIS is now Research Engineer, Assistant General Manager, French

Petroleum Institute, Paris, France. He was formerly Research Engineer, Compagnie Francaise de Raffinage, Paris, France.

E. B. PENROD, formerly Research Engineer, Armour Research Foundation, Illinois Institute of Technology, Chicago, Ill., is now Professor and Head of Department of Mechanical Engineering, University of Kentucky, Lexington, Ky.

T. McL. JASPER, who was formerly Technical and Research Director, General American Transportation Corp., Chicago, Ill., is now Consulting Engineer, John Thompson Engineering Co., Inc., Wolverhampton, England.

C. D. TOWNSEND is now Plant Superintendent, The S. K. Wellman Co., Cleveland, O. He was formerly Plant Engineer with this same company.

G. M. YOUNG, formerly Chief Metallurgist, Aluminum Company of Canada, Montreal, P. Q., Canada, is now Technical Director in this same organization.

R. W. PLUMMER, who was formerly a consultant in Washington, D. C., is now General Manager, Fabrica Eureka, S. A., Mexico, D. F., Mexico.

D. F. SMITH is now with the Southport Petroleum Co. of Delaware, Texas City, Tex. He was formerly Owner and General Manager, Daniel F. Smith Laboratories, Houston, Tex.

W. D. ROBERTSON, formerly Research Metallurgist of Aluminum Laboratories, Ltd., Kingston, Ont., Canada, is now Research Assistant in Metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

R. A. LUBKER, who was formerly Non-ferrous Metallurgical Engineer, Westinghouse Electric Corp., East Pittsburgh, Pa., is now Research Metallurgist, Armour Research Foundation, Chicago, Ill.

Effective September 1, 1946, BRYANT MATHER, who is now Engineer, Central Concrete Laboratory, Corps of Engineers, U. S. Army, Mount Vernon, N. Y., will assume his new position as Engineer, Concrete Research Div., U. S. Waterways Experiment Station, Clinton, Mass.

L. W. BALL is now Chief, Materials Testing and Inspecting Laboratory, Naval Ordnance Laboratory, Washington, D. C. He was formerly Assistant Technical Director, Triplett and Barton, Inc., Burbank, Calif.

J. H. GETZ, JR., formerly Architect, The Atlantic Refining Co., Philadelphia, Pa., is now Service Station Engineer, Tide Water Associated Oil Co., Philadeldelphia, Pa.

C. J. HEJDA has retired from the Commonwealth Edison Co. and F. B. Johnson has replaced him as Chief Testing Engineer and representative in the Society.

JOHN A. SCHUCH, who was formerly Chief Spectrographer, Harry W. Dietert Co., Detroit, Mich., is now Detroit Representative, Applied Research Laboratories, Detroit, Mich.

EARL M. BROHL is now with the Farrant Optical Co., Inc., New York, N. Y. He was formerly Engineer of Standards and Tests, Bendix Aviation Corp., Norwood, Mass.

SHERMAN GREENBERG, formerly Chemist, Metasap Chemical Co., Harrison, N. J., is now Chemical Engineer, Argonne National Laboratory, Chicago, Ill.

WILLIAM J. PHILLIPS, who was formerly Manager, Industrial Casting Sales, The Symington-Gould Corp., Rochester, N. Y., is now Vice-President of Sales, Phillips Foundry Co., Bakersfield, Calif.

G. H. RAYBORN, JR., is now Chief Chemist, Gulf Naval Stores Co., Gulfport, Miss. He was formerly Chief Chemist, Southern Naval Stores Co., Columbia, Miss.

T. J. GROSS, formerly President, Container Testing Laboratories, Inc., New York, N. Y., is now Managing Director, The Shipping Container Institute, New York, N. Y.

R. W. WELLWOOD, who was formerly Wood Technologist, Commonwealth Plywood Co., Ltd., Ste. Therese, P. Q., Canada, is now Associate Professor of Forestry, University of British Columbia, Vancouver, B. C., Canada.

O. K. SCHMIED is now with the Cochran Foil Co., Louisville, Ky. He was formerly with the Reynolds Metals Co., Richmond, Va.

H. S. MATTIMORE, formerly Senior Engineer, Public Works Dept., U. S. Navy, Colonial Park, Pa., has now become an Engineering Consultant in Colonial Park, Pa.

The Kellex Corporation has announced the appointment of DR. CARL E. SWARTZ, formerly Chief Metallurgist of Cleveland Graphite Bronze Co., as Division Engineer in charge of Materials Research. Dr. Swartz will be presently assigned to the Research Unit of The Johns Hopkins University Applied Physics Laboratory, 8621 Georgia Avenue, Silver Spring, Md., with which the Kellex Corporation has recently become associated in a special project for the United States Navy.

J. J. SHUMAN has retired from his position of Inspecting Engineer, Jones & Laughlin Steel Corp., Pittsburgh, Pa., as of July 1, 1946.

JOHN C. SPRAGUE, Engineer-in-Charge of the Division Materials Testing Laboratory, South Atlantic Division, Corps of Engineers, U. S. Army, has moved to Marietta, Ga., new headquarters of the laboratory having been transferred there from Jacksonville, Fla. Prior to his connection with the Corps of Engineers, Mr. Sprague was Development Engineer with Dravo Corp., Pittsburgh, Pa.

F. W. SMITHER has retired from his position of Chemist, National Bureau of Standards, Washington, D. C., as of July 1, 1946.

At the May 23 meeting of its Nominating Committee, A.S.M. has nominated A. L. BOEGEHOLD, Research Department, General Motors Corp., Detroit, Mich., for President; F. B. FOLEY, Superintendent of Research, The Midvale Co., Philadelphia, Pa., for Vice-President; and A. E. FOCKE, Research Metallurgist, Diamond Chain and Manufacturing Co., Indianapolis, Ind., for Trustee. W. H. EISENMAN has been nominated for another term for Secretary.

M. N. CLAIR, Vice-President and Treasurer, The Thompson & Lichtner Co., Inc., whose office was formerly located in Boston, Mass., is now at 8 Alton Place, Brookline, Mass.

CHARLES E. WUERPEL, Engineer in Charge, Central Concrete Laboratory, U. S. Army, Corps of Engineers, Mount Vernon, N. Y., has been transferred to Concrete Research Division, U. S. Waterways Experiment Station, Clinton, Miss., because of the de-activation of the laboratory at Mount Vernon.

L. M. CURRIE, Vice-President in Charge of Research, National Carbon Co., Inc., Research Laboratories, Cleveland, O., has been in the South Pacific as an observer of "Operation Crossroads." He is moving his office from Cleveland to New York.

CHARLES B. BRYANT, formerly Assistant to Vice-President, Southern Railway System, has been appointed Chief Engineer of the Technical Board of the Wrought Steel Wheel Industry, succeeding Mr. C. T. Ripley. Mr. Bryant has been very active in the work of A.S.T.M., particularly on Committees A-1 on Steel and A-2 on Wrought Iron, is a graduate of Johns Hopkins University, and later was for several years with the Portland Cement Association, and still later with the Maryland State Roads Commission. He has been with the Southern Railway System since 1943. He has been quite active in the work of the Association of American Railroads. His office will be located at 310 South Michigan Boulevard, Chicago 4, Ill.

R. S. HUNTER, formerly connected with the National Bureau of Standards, Washington, D. C., which Bureau he represented on A.S.T.M. Committees D-1 on Paint, Varnish, Lacquer, and Related Products, and D-20 on Plastics, is now with Henry A. Gardner Laboratory, Bethesda, Md., where he is Physicist. He will now represent this Laboratory on D-1 and D-20.

SMITH-EMERY CO. and R. A. Perez Co., assayers, chemists, and engineers, announce the consolidation of their laboratories. The R. A. Perez Co. is giving up its present location so that all work will be done at the present address of Smith-Emery Co., 920 Santee St., Los Angeles. Also, the John Herman Laboratories are being consolidated with Smith-Emery Co. This brings together three of

the oldest commercial testing laboratories in the Southwest and will provide increased facilities for executing technical laboratory services.

The advisory committee on metallurgical engineering, set up in connection with new courses at Drexel Institute of Technology, includes several men very active in A.S.T.M. work, including the following: G. H. Clamer, President and General Manager, The Ajax Metal Co., Philadelphia, Pa.; W. J. Diederichs, Metallurgist, The Autocar Co., Ardmore, Pa.; Francis B. Foley, Superintendent of Research, The Midvale Co., Philadelphia, Pa.; N. L. Mochel, Manager, Metallurgical Engineering, Westinghouse Electric Corp., Philadelphia, Pa.

The new courses of study, according to Professor A. W. Grosvenor who will direct them, will include metallography, production of non-ferrous metals and iron and steel, metallurgy of welding including radiography, approached as an engineering rather than as a mechanical problem; foundry metallurgy, corrosion and heat resistance of alloys and advanced materials of construction. Since there seems to be greater demand in the Philadelphia area for courses in physical metallurgy, the emphasis in the curricula is to be placed in that direction.

LT. COL. M. H. BIGELOW is back in the United States after a considerable period of service in Germany and is spending his terminal leave at his home, Oak Knoll Farm, Temperance, Mich., and can be addressed at that location. He was in the Government service, chiefly in the Quartermaster Corps and the Chemical Warfare Service of the U. S. Army for a few weeks less than four years. Colonel Bigelow had been very active in A.S.T.M. work, notably in Committee D-20 on Plastics and also in other groups including D-14 on Adhesives. He also served a term as a member of the Society's Executive Committee.

T. A. FITCH, Director, City of Los Angeles Department of Public Works, Office of Bureau of Standards, Los Angeles, Calif., leaves public service as of August 15. Mr. Fitch has been very active in connection with the Southern California District Committee, serving as an officer for several years. He was a member of the A.S.T.M. Executive Committee and was interested in the work of a number of technical committees. For the immediate future, he and Mrs. Fitch plan to catch up on some of their postponed traveling.

CAPTAIN VICTOR HICKS, USNR, has recently been released from active duty after approximately five and a half years of Naval service with the Bureau of Ordnance. His wartime duties included responsibilities for the early stages of the research on the radio proximity fuze, and for the development and design of all American sea-borne rocket launchers. Dr. Hicks has joined Ansco in Binghamton, N. Y., as a technical physicist with duties in connection with the development, production, and utilization of radiographic films. Prior to the war, he was physicist in charge of research for the Westinghouse X-Ray Co.

Dr. A. ALLEN BATES has been elected to the newly created post of Vice-President for Research and Development, PORTLAND CEMENT ASSOCIATION, Chicago, Ill. Since 1938 Dr. Bates has been Manager of the Chemical, Metallurgical and Ceramic Research Division, Westinghouse Electric Corp., Pittsburgh, Pa. Dr. Bates has been the speaker at several A.S.T.M. district meetings.

RICHARD P. SEELIG has joined the staff of American Electro Metal Corp., Yonkers, N. Y., where he will be concerned principally with engineering and tooling for production work, and engineering developments on new processes. He was formerly connected with Powder Metallurgy Corp., Long Island City, N. Y. for eight and a half years.

M. O. WITHEY has been appointed Dean of the College of Engineering, University of Wisconsin. He has been at the University since 1905, and most recently has been Professor of Mechanics. A member of A.S.T.M. since 1907, he has contributed a great deal to the advancement of the Society's work, serving on several technical and administrative committees and prepared numerous contributions which have been included in the A.S.T.M. *Proceedings*, and in general taken a very active part in many phases of A.S.T.M. work.

Past-President J. R. TOWNSEND, Materials Engineer, Bell Telephone Laboratores, Inc., was one of the three men who served as judges in the Second Annual Die Casting Award Contest which is sponsored by the magazine *Die Casting*. Serving with him were Carl F. Scott, Assistant to the Manager of Engineering, Appliance and Merchandise Department, General Electric Co., and Francesco Collurs, a New York industrial designer.

Among the A.S.T.M. members who are officers and directors of the Engineering Society of Detroit for the current year are the following: *Secretary:* JAMES C. ZEDER, Chief Engineer, Engineering Division, Chrysler Corp., Detroit, Mich.; *Directors:* T. A. BOYD, Head, Fuel Department, Research Labs. Div., General Motors Corp., Detroit 2, Mich., and VAN M. DARSEY, President, Parker Rust Proof Co., Detroit, Mich. Clement J. Freund, Dean of the College of Engineering, University of Detroit, is the current President of the Engineering Society of Detroit.

NECROLOGY

(Dates of death are given where available)

L. H. GEISENBERGER, Chief Chemist, Research Laboratories, Johns-Manville Corp., Manville, N. J. (May 15, 1946). Mr. Geisenberger's membership in the Society dates from 1942. He was a member of Committee D-1 on Paint, Varnish, Lacquer, and Related Products where he was active on Subcommittee VIII on Methods of Analysis of Paint Materials, and also held membership on Committee C-1 on Cement where he was especially interested in the work of the committee on bleeding, plasticity, and workability.

A. W. BURWELL, Vice-President and Technical Director, Alox Corp., Niagara Falls, N. Y. (May 24, 1946). Mr. Burwell was a member of the Society from 1933 until his death and was active in the work of Committee B-8 on Electrodeposited Metallic Coatings, especially the subcommittee on Supplementary Protective Finishes for Metallic Coatings.

H. E. CUTTS, Vice-President and Treasurer, Stillwell & Gladding, Inc., New York, N. Y. (May 20, 1946). Mr. Cutts' membership in A.S.T.M. dates from 1936. He served on Committee D-1 on Paint, Varnish, Lacquer, and Related Products where he was especially interested in the work of Subcommittee V on Volatile Solvents for Organic Protective Coatings, and also on Committee D-12 on Soaps and Other Detergents where he was active on Subcommittees I on Methods of Testing and II on Specifications.

J. D. STODDARD, Vice-President and General Manager, The Detroit Testing Laboratory, Detroit, Mich. (May 9, 1946). A member of the Society since 1931, Mr. Stoddard served on Committee A-3 on Cast Iron where he was active in the work of Subcommittee XXI on Pressure Pipe, and also was a member of ASA Sectional Committee Z 21 on Approval and Installation Requirements for Gas Burning Appliances. He was a member of ASA A 40 on Standardization of Plumbing Equipment from 1936 to 1938.

O. O. MALLEIS, Technical Adviser, Bituminous Coal Producers Advisory Board for District No. 8, Cincinnati, Ohio. (May 24, 1946). Member since 1916. Mr. Malleis was interested in the work of Committee D-5 on Coal and Coke and served as Vice-Chairman of that committee for several years. He represented Committee D-5 on the Section on Sieves of the Subcommittee on Size and Shape of Committee E-1 on Methods of Testing and served as a member of Committee D-1 on Paint, Varnish, Lacquer, and Related Products from July 1931 until June 1933. He was also a member of the ASA Sectional Committee Z 23 on Specifications for Sieves for Testing Purposes.

ROBERT B. SHEPARD, Chief Electrical Engineer, Underwriters' Laboratories, Inc., New York, N. Y. (June 20, 1946). Mr. Shepard's membership dates from 1935. He was a member of Committee D-9 on Electrical Insulating Materials where he was interested in the work of Subcommittee III on Plates, Tubes and Rods.

G. L. BALL, Secretary and Treasurer, Ball Chemical Co., Glenshaw, Wittmer Station, Allegheny County, Pa. (October 6, 1945). A member of the Society since 1941, Mr. Ball was active in the work of Committee D-1 on Paint, Varnish, Lacquer, and Related Products.

K. N. KATHJU, Technical Director, The Arco Co., Cleveland, Ohio. (February 16, 1946.) Member since 1939.

G. H. TODD, President, Texas Testing Laboratories, Inc., Dallas, Texas. Member since 1937.

J. C. HERR, Chief Metallurgist, The Youngstown Sheet and Tube Co., East Chicago, Ind. Member since 1935.

I. T. FAUCETT, General Cable Corp., Bayonne, N. J. (January 16, 1946.) Representative of company membership since September, 1945.

C. HUDDLESTON BEAR, Executive Secretary, Oxychloride Cement Association,

Inc., Washington, D. C. (June 5, 1946.) Representative of his company since membership was taken out in 1946.

W. G. Bjorkstedt, Metallurgist, International Projector Corp., New York, N. Y. Representative of company membership since 1943, when membership was taken out.

M. E. Holmes, Dean, New York State College of Ceramics, Alfred, N. Y. (May 5, 1946.) Dean Holmes represented the New York State College membership from 1933, when first taken out, until 1946. He was a member of Committee C-8 on Refractories where he was active on Subcommittees VI and IX covering Specifications and Classifications, respectively. He also represented Committee C-8 on Committee E-8 on Nomenclature and Definitions.

A. C. Corr, Gates Rubber Co., Denver, Colo. A committee member of the Society, Mr. Corr was alternate for K. G. Custer on Section VI on Automotive V-Belts of Technical Committee A on Automotive Rubber of Committee D-11 on Rubber and Rubber-Like Materials.

John Foley, Wayne, Pa. A Society committee member, he was a member of ASA Sectional Committee on Methods of Testing Wood from 1939 to his death.

Morris C. Schwartz, Assistant Professor of Chemical Engineering and Assistant Director of the Engineering Experimental Station, Louisiana State University, Baton Rouge, La. (May 26, 1946). A Society committee member, he was the representative of Louisiana State University on Committee D-19 on Water for Industrial Uses where he was active in the work of Subcommittees II, III, IV, and V on Editorial, Methods of Sampling, Method of Analysis, and Classification.

Catalogs and Literature Received

W. & L. E. Gurley, Troy, N. Y. Bulletin No. 1600 covering "Gurley Textile Testing Instruments" describes the Gurley Permeometer, Densometer, and R. D. Stiffness Tester. Detailed descriptions as well as illustrations are given for each piece of equipment. 16 pages.

Also, a booklet entitled "We Saw It Through" commemorating a century of service.

The National Supply Co., Pittsburgh, Pa. Bulletin No. 327 giving six cutaway drawings of typical applications of the company's type "W" tubing head, together with photographs and technical data on the tubing head bodies and adapter flanges. Copies of the Bulletin can be obtained by writing the company, P. O. Box 899A, Toledo 1, Ohio.

W. H. & L. D. Betz, Gillingham and Worth Sts., Philadelphia 24, Pa. A 16-page folder describing "The Six Fundamentals of Betz Water Conditioning Service." Illustrates and describes how W. H. and L. D. Betz extends a supervisory service for boiler water conditioning, and outlines, step by step, the procedure followed which leads to trouble-free boiler plant operation.

Eastman Kodak Co., Rochester 4, N. Y. A booklet entitled "Kodak Data Book on Formulas and Processing," 72 pages. Contains a comprehensive list of Kodak formulas together with a discussion of principles and procedures for processing films, plates, and papers, a new section on Negative Faults (how to recognize them and identify their cause) and the formula is given for the new Kodak Quinone-Thiosulfate Intensifier IN-6 for use with very weak negatives. Available at 25 cents.

Also, a 16-page bibliography of "Articles and Books on Spectrography" listing articles and books covering the broader aspects of chemical spectrography, equipment and supplies, flash spectrography, infrared spectrography, etc.

An eight-page booklet "Articles and Books on Industrial Photoreproduction" includes sources of information on phototemplates and photolofting, photodials, nameplates, and instruction plates, and photo-rigid printing for stress analysis. For both of these booklets, available without charge, write Industrial Photographic Sales Division, Eastman Kodak Co., 343 State St., Rochester 4, N. Y.

Unknown Addresses

Anyone knowing the address of any of the following members whose last known address is given below is asked to notify the Executive Secretary:

M. U. Cohen, Associate Laboratory Director, Gussack Machined Products Co., 10-20 Forty-fifth Rd., Long Island City 1, N. Y.

W. L. Egy, Plant Manager, Sonotone Corp., 92 Main St., White Plains, N. Y.

Rolfe H. Ehrmann, Research Chemist, U. S. Stoneware Co., 270 Lincoln Ave., Ravenna, Ohio.

Leonard E. Ravich, 150 New Park Ave., Hartford 6, Conn.

David F. Seymour, Chemical Engineer, Promat Division, Poor and Co., 851 S. Market St., Waukegan, Ill.

Size Simplification for Hot-Rolled Carbon-Steel Bars

Simplified Practice Recommendation R222-46, which became effective on June 30, applies to hot-rolled carbon steel bars and bar-size shapes (produced from billets or blooms). The purpose of this recommendation developed by the Division of Simplified Practice, National Bureau of Standards, is to direct attention to the nominal sizes of bars and bar shapes that are in most general use and demand. Copies of this document can be obtained from the Superintendent of Documents, U. S. Government Printing Office, at 10 cents per copy.

Essentially, the list is based on a WPB Limitation Order issued during the war period, but it has been expanded to apply to normal needs and requirements. The pamphlet giving the tables of sizes also includes an extensive list of those who have in writing indicated their acceptance of the recommendations.

Calendar of Society Meetings

American Chemical Society—110th Meeting, September 9–13, Chicago, Ill.

National Chemical Exposition—September 10–14, Coliseum, Chicago, Ill.

Instrument Society of America—National Instrument Conference, September 16–20, Hotel William Penn, Pittsburgh, Pa.

Illuminating Engineering Society—Annual Convention, September 18–20, Chateau Frontenac, Quebec, Canada.

National Petroleum Association—Forty-fourth Annual Meeting, September 18–20, Hotel Traymore, Atlantic City, N. J.

American Society of Mechanical Engineers—Fall Meeting, September 30–October 2, Boston, Mass.; Annual Meeting, December 2–6, New York, N. Y.

National Lubricating Grease Inst.—Annual Convention, Sept. 30–Oct. 2, Edgewater Beach Hotel, Chicago.

American Gas Association—Annual Meeting, October 7–12, Atlantic City, N. J.

American Welding Society—Annual Meeting, November 17–22, Atlantic City, N. J.

Society of Automotive Engineers—National Fuels and Lubricants Meeting, November 7–8, Mayo Hotel, Tulsa, Okla.

American Petroleum Institute—Twenty-sixth Annual Meeting, November 11–14, Stevens Hotel, Chicago, Ill.

National Metal Congress Exposition—November 18–22, Atlantic City, N. J.

National Power Show—December 2–7, New York, N. Y.

Highway Research Board—Annual Meeting, December 5–8, National Academy of Sciences and National Research Council Building, Washington, D. C.

American Society of Refrigerating Engineers—Annual Meeting, December 16–18, New York, N. Y.

American Association for the Advancement of Science—Annual Meeting, December 26–31, Boston, Mass.

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